AN EXPLORATORY INVESTIGATION OF A STRESS MODEL OF MEDICATION ADHERENCE AMONG ELDERLY OUTPATIENTS

By

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I wish to dedicate this dissertation to the veterans who have not only supported me during this academic endeavor but who have also defended the beliefs and values of my homeland.

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Most of us have found ourselves driving an automobile in city traffic during rush hour. If you were in a hurry to get to work on time and were trying to do so in the most efficient manner, you may have been required to deal with a number of irritations, minor annoyances, or hassles. If this situation occurred more than once, you may have at one time made the trip alone, another time with someone who was just there for the ride and did not do anything other than sit, and yet another time with someone in the car who was helpful, acting as "another set of eyes" to look for traffic hazards and making suggestions on how best to proceed. There may also have been a similar situation in which the traffic hassles had become so overwhelming that you felt the person wasn't helping at all and you reacted poorly by slowing down or stopping. This situation with its different scenarios could be understood as a metaphor for life. Ironically, it is also the focus of this dissertation.

During my graduate work at the University of Florida, I have not been alone on my metaphorical trip. Neither have I been driving with persons who just sat there. The people along this part of my journey were genuinely interested in my well-being and proactively helped to keep my stress level down. In a real way, they all provided me with "another set of eyes."

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I wish to acknowledge the considerable skill of authors like Richard S. Lazarus and Sheldon Cohen whose talents are reflected in the pages of this dissertation and whose names appear in the references. I tend to think of this research project as an adaptation of their hard work. I can only hope that some day a graduate student will read a paper of mine and do the same.

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Abstract of Dissertation Presented to the Graduate School
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AN EXPLORATORY INVESTIGATION OF A STRESS MODEL OF MEDICATION ADHERENCE AMONG ELDERLY OUTPATIENTS

By

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The study had two objectives: 1) to develop and validate constructs of a proposed Stress Model of Medication Adherence, and 2) to examine some of the more important relationships among these constructs. The study employed an exploratory, retrospective, cross-sectional design with a sample of veterans over 65 years of age living in north central Florida and southern Georgia and receiving one or more medications on a regular basis through the mail. The study was conducted in two phases. In the pilot phase, an initial questionnaire was developed and tested using a convenience sample of 94 subjects. In the main phase, a revised questionnaire was mailed to a convenience sample of 1,600 subjects. 1,017 responses were used to establish the internal validity of the constructs and to test hypothesized relationships in the proposed model. The dependent variable in the model was medication adherence. The independent variables included medication related stressors and medication specific social support. Perceived medication stress was either a dependent or independent variable depending on the context in which it was used. Descriptive statistics and correlational analyses were used to initially address the validation of the four scales. Next, factor analyses were used to evaluate the dimensionality of the items in the questionnaire. Four types of stressors were found: advising, isolating, reminding, and obtaining. And, four types of social support were found for doctor, pharmacist and most concerned other person: consultation, affirmation, actuation, and acquisition. Next, multiple regression was used to test hypothesized main, mediator, and moderator relationships among adherence, stressors, perceived stress and social support. Perceived stress was found to partially mediate the relationships between all four types of stressors and medication adherence. This suggests that these stressors generate patient evaluations of medication taking that effect medication adherence negatively. Finally, some types of social support from the doctor and pharmacist were found to moderate the relationship between some types of stressors and perceived stress. This suggests that more than a threshold level of some types of social support from the doctor or pharmacist are required to prevent patient generation of perceived medication stress.

CHAPTER 1
OVERVIEW OF THE ISSUES ADDRESSED BY THIS RESEARCH

Medication Adherence

> Drugs provide society with enormous benefits. They reduce mortality and morbidity relieve pain and suffering, are less expensive forms of treatment than surgery and hospitalization, are more readily accessible to a larger portion of the population than are more expensive technologies, and have enabled physicians to see more patients with improved outcomes (Feldstein, 1988, pp. 437)

Despite Feldstein's glowing portrayal of drugs, the real world results of drug use are far less than optimal. For the elderly, this may be due in part to medication nonadherence. Estimates of medication nonadherence in this population range from 40 to 75% (Cooper, Love and Raffoul, 1982; Lipton and Lee, 1988), and this nonadherence has been associated with a higher risk of hospitalization, which has been estimated to cost approximately $2,150 per admission (Col et al., 1991). Furthermore, it is anticipated that the problem of medication nonadherence among the elderly will become critical in the near future as the world's population grows progressively older (Pucino et al., 1985).

It will become increasingly necessary for health practitioners to improve medication adherence to obviate the need for more expensive medical care (Lipton, 1982; Gryfe and Gryfe, 1984). To improve medication adherence among the elderly will require a better understanding of three variables: stressors, perceived stress, and social support. The significance of these three variables will be discussed in the following sections. The chapter will conclude with a problem statement.

Medication-related Stressors

> Medication nonadherence is not a unique phenomenon associated with aging. Many of the same problems concerning taking medications most appropriately apply to 40 year olds as well as to 80 year olds. What is unique about the elderly is their greater sensitivity to medications, their greater propensity for the development of adverse effects, and the greater complexity of their regimens as they develop chronic illnesses through the course of their lives. In addition, decreasing acuity of special senses, problems with memory, and the interposition of other care givers are all unique phenomena that have to be dealt with. (Weintraub, 1990, pp. 445).

Weintraub's depiction of the serious problems faced by the elderly attempting to adhere to their medication regimens is insightful. However, for a more encompassing depiction of these problems one needs to examine the alarming statistics that underpin this rendering.

Elderly patients use more medications than younger patients, and the trend of increasing drug use continues through 80 years of age. Studies conducted in a variety of settings have shown that patients over 65 years of age use an average of 2 to 6 prescribed medications and 1 to 3.4 non-prescribed medications (Stewart and Cooper, 1994). It is known that the use of multiple medications increases the risks of adverse drug reactions, drug-drug interactions, and makes medication adherence more difficult (Fedder, 1984).

Elderly patients also have to deal with problems associated with altered pharmacokinetic and pharmacodynamic effects of drugs (Hoffler, 1981; Roberts and Turner, 1988; Dawling and Crome, 1989; Fox and Auestad, 1990; Taylor, 1990). There may be changes in the absorption of orally administered drugs, body composition, serum albumin and globulin concentration, cardiac output and hepatic metabolism, renal blood flow, renal function and homeostatic mechanisms (Shaw, 1982; Chapron, 1995).

Elderly patients also must struggle with a number of disease changes that occur with aging (Salzman, 1982; Tuck, 1988; Furberg and Black, 1988). For example, the incidence and prevalence of congestive heart failure increases exponentially with advancing age (Hunziker and

Bertel, 1995), and gastrointestinal problems become more common in the elderly (Levitan, 1989). Indeed, Dall (1989) has stated that side effects seem to increase and medication adherence seems to decrease as elderly patients suffer from increased comorbidities.

There are also age-related changes in vision, hearing, memory, and learning (Kimberlin, 1995). These changes and the inability to read and interpret prescription labels, open and close vials, remove tablets, and identify tablet colors have all been demonstrated to have a negative effect on medication adherence (Meyer and Schuna,1989).

Although numerous studies have specified the experience of these problems among the elderly, few studies have attempted to quantify these problems as stressors. Furthermore, few studies have attempted to place these stressors into a theoretical framework for understanding how these medication-related stressors might effect an elderly patient's perception of stress.

Perceived Medication Stress

Elderly patients may experience and then evaluate that experience with a medication-related stressor. The patient's evaluation of all these experiences may leave the patient with feelings that are favorable for medication nonadherence. In a recent study involving older adults taking prescribed medications, it was found that 21% had been nonadherent during the month preceding the study (Coons et al., 1994). Furthermore, higher perceived stress was significantly associated with medication nonadherence. Although this study specified an important correlation between perceived stress and medication nonadherence, the effect of social support on the relationship between perceived stress and medication nonadherence was not examined.

Medication-specific Social Support

The negative effects of a stress process among elderly outpatients taking medications may be alleviated with social support. As chronic "age-related" changes in physiology become more prevalent, increasing numbers of the elderly experience declined activities of daily living. These patients not only require assistance with such activities as basic hygiene, dressing, eating, and answering the telephone, but also with taking their medication. For example, a significant association was found between spousal support and an elderly patient's adherence to coronary medications (Doherty et al., 1983). In another study, a considerable number of patients were found to benefit from the assistance of a relative or home helper in administering treatments (Gilmore, Temple, and Taggart, 1989). This study also recommended that a suitable helper be identified and counseled to assist at-risk elderly patients with their medication.

Among health care professionals, support activities specific to the needs of the elderly taking medications have been found to result in better medication adherence among elderly patients. For example, weekly pharmacist counseling sessions resulted in improvements in medication adherence among one subgroup of elderly patients (Wolf et al., 1989). In addition, among elderly patients belonging to the other subgroup, their identification as nonadherers helped pharmacists reduce medical misjudgement when making changes to a nonadherer's prescribed medications. In another study involving nurse practitioners and elderly women, a patient's perception of high psychosocial care was the only component of a nurse's visit that had an impact on the patient's intent to adhere (Chang et al., 1985).

In two older reviews of the literature, not specific to the elderly, these findings are indirectly supported, and one draws attention to an important methodological concern. The first review of the literature (Baekelund and Lundwall, 1975) found 19 studies on social support and dropping out of treatment. In all 19 studies, dropping out was associated with low social support. In the second review of the literature (Haynes and Sackett, 1977), 25 studies reported predictors which were indicators of social support. Sixteen of these studies supported a positive relationship between social support and medication adherence; only one study showed a negative relationship, and eight studies showed no relationship to medication adherence. Haynes and Sackett (1977) gave poor ratings to four of these latter eight studies on the quality of the social support measures. Even if the other half of the "non-replications" had reliable, valid measures, the percentage of studies that suggest that social support improves medication adherence remains very high. These studies suggest that the reliability and validity of the social support measures will be critical when rigorously testing the impact of social support on medication adherence.

Problem Statement

Medication nonadherence is a significant problem among elderly outpatients and will assume even greater importance in the near future. Stressors, perceived stress, and social support have been connected with medication nonadherence among the elderly. Social support from health professionals and family members may help the elderly patient more easily deal with stressors and perceived stress and must be carefully measured. The next chapter will propose a Stress Model of Medication Adherence (SMMA).

CHAPTER 2
THEORETICAL FRAMEWORK

Introduction

This chapter begins by briefly describing a stress model. After this short depiction, the model will be adapted in the next section to describe the medication-taking experiences of elderly outpatients. It will be known as the Stress Model of Medication Adherence (SMMA). In the following section, some of the more important constructs in the Stress Model of Medication Adherence (SMMA) and the relationships among them will be initially examined by focusing on the "nucleus" of the Stress Model of Medication Adherence (SMMA-n). After developing and describing hypothesized relationships among the constructs in the SMMA-n, two "overarching" research questions will be presented.

A Stress Model

Soon after Lazarus (1966) published Psychological Stress and the Coping Process, cognitive approaches to stress were more fully developed by additional investigators. Along with renewed interest in emotions and behavioral medicine, the issues of stress in adult life and aging, as well as stress management, gained attention. Since that time, there has also been a dramatic increase of interest in the concept of social support as it affects health and well-being. This interest is reflected in an explosion of research as well as an increase in the number of treatment and intervention programs that use social support for therapeutic assistance.

Figure 2.1 presents a theoretical model (Israel and Schurman, 1990) that shows the general relationships among the theoretical constructs that have been developed over the last three decades. This conceptual framework is based on earlier models of social-environmental determinants of health (Lazarus, 1966; McGrath, 1970; Katz and Kahn, 1978), occupational stress, social support, health (House, 1974, 1981), and stress control (Carver and Scheier, 1982; Leventhal and Nerenz, 1983). The model postulates the following set of five elements in the stress process: 1) People may experience a set of psychosocial-environmental conditions conducive to stress (stressors) that place them at risk for physical, psychological, and behavioral disorders. These conditions or stressors do not invariably result in long-term negative outcomes; rather, their effects depend on 2) the perceptions and responses to the stressors by the people involved. An individual may perceive a stressor as threatening, exciting, challenging, or stressful. When an individual perceives a stressor in the environment, he or she may respond in one or more ways: psychologically, behaviorally, and physiologically. The sequences of response to perceived stress are not necessarily bad, and, depending on the specific pattern of relationships among stressor, perception, and response, the stress reaction may be helpful and even pleasurable. However, when the demands placed on people by their environment exceed their abilities, or when people are not able to meet strong needs, conditions are perceived as stressful (McGrath, 1970). 3) Negative short-term responses to stress may occur that may lead, over time, to 4) enduring poor health outcomes. The framework further posits that no objective stressor is likely to produce the same perceptions of stress or resultant short-term responses or enduring outcomes in all people exposed to the stressor. Rather, 5) certain individual and situational characteristics influence how an individual experiences the stress process. Social, psychological, biophysical, and genetic "conditioning" factors influence how an individual experiences the stress process.

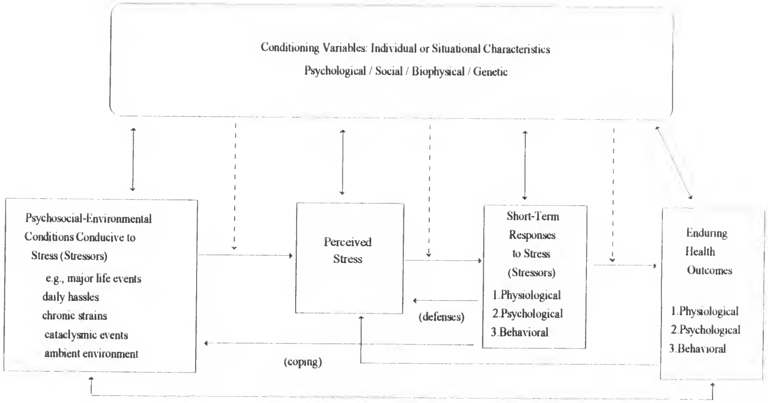


Figure 2.1 A stress model (Israel and Schurman, 1990)

The Stress Model of Medication Adherence (SMMA)

Figure 2.1 presents a theoretical model that shows the general relationships among a number of variables that could explain medication adherence. An adapted model is presented in Figure 2.2--the Stress Model of Medication Adherence (SMMA). It incorporates medication-related stressors, medication-specific social support, ethnicity, income, age, gender, health status, perceived medication stress, medication adherence, and enduring health outcomes into a theoretical framework.

An example from a health care setting illustrates the components of this adapted framework and depicts the model as it relates to the research problems described in the first chapter. An elderly outpatient may experience one or more stressors (medication-related stressors) which may invoke perceived stress (perceived medication stress). This elderly individual may receive social support (medication-specific social support) from his or her prescribing physician or confidant. Also, a patient's ethnicity, income, age, gender, and health status may be important conditioning variables in the proposed model. For example, if the patient lives among other American Indians he or she may be encouraged to use instead a tribal remedy. Also, the patient may not be able to afford his or her medication. And, if the elderly patient is among the "young-old" elderly he or she may find it easier getting to the pharmacy than a patient that is among the "old-old" elderly. If the patient's health status is poor he or she may have difficulty remembering to take all of his or her medications. Finally, the model suggests how enduring outcomes (measured by a patient's quality of life) can have a feedback effect on medication adherence, as for example, a deterioration in quality of life can lead to a deterioration in medication adherence (Williams, 1987; Julius, 1988).

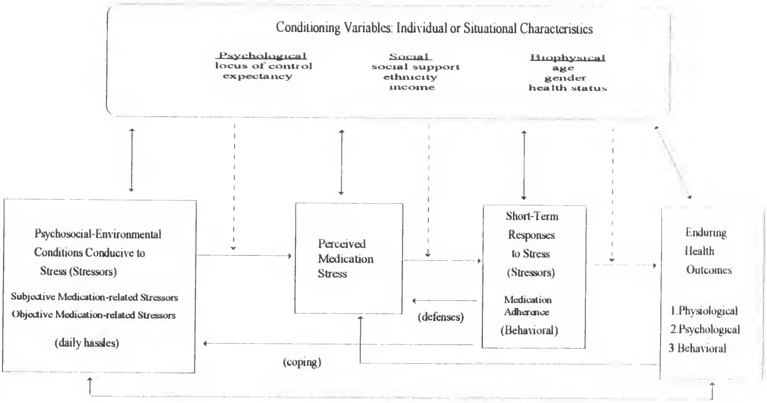


Figure 2.2 The Stress Model of Medication Adherence (SMMA)

The "Nucleus" of the Stress Model of Medication Adherence

The nucleus of the proposed Stress Model of Medication Adherence can be envisioned where perceived medication stress acts upon one relationship in the model, while medication-specific social support acts upon two other relationships in the model (see Figure 2.3). Each of these will be discussed in turn.

Perceived medication stress acts upon the relationship between medication-related stressors and medication adherence. It is important to understand that perceived medication stress is thought to have either a main (direct) effect, or a mediating (indirect) effect on the relationship between medication-related stressors and medication adherence. When perceived medication stress exhibits a main effect on the relationship between medication-related stressors and medication adherence, perceived medication stress will have a detrimental effect on medication adherence regardless of the level of medication-related stressors. For example, an elderly man who generates feelings of guilt or anxiety when he gets off track with his medication taking, may not adhere to his medication taking despite the frequency of his experiences with medication problems. When perceived medication stress exhibits a mediating effect on the relationship between medication-related stressors and medication adherence, a high level of experience with medication-related stressors might generate higher feelings of guilt or anxiety by various processes internal to the person and cause him not to adhere to his medication taking.

Medication-specific social support acts on two other relationships. In the first relationship, medication-specific social support acts upon the association between medication-related stressors and perceived medication stress. In the second relationship, medication-specific social support acts upon the association between perceived medication stress and medication adherence. It is important to understand that medication-specific social support is thought to have either a main (or

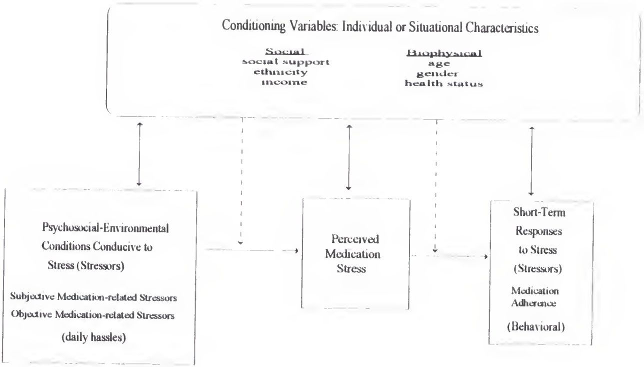

Conditioning Variables: Individual or Situational Characteristics
Social
social support
ethnicity
income
Biophysical
age
gender
health status
Psychosocial-Environmental Conditions Conducive to Stress (Stressors)
Subjective Medication-related Stressors
Objective Medication-related Stressors
(daily hassles)
Perceived Medication Stress
Short-Term Responses to Stress (Stressors)
Medication Adherence
(Behavioral)

Figure 2.3 The "nucleus" of the Stress Model of Medication Adherence (SMMA-n)

direct) effect, or a moderating (or buffering) effect on these relationships. How medication-specific social support exhibits a main effect will be discussed, and then a discussion of how medication-specific social support exhibits a moderating effect will follow.

When medication-specific social support exhibits a main effect on the relationship between medication-related stressors and perceived medication stress, a threshold level of effort will have a certain beneficial effect regardless of the patient's level of medication-related stressors. For example, if a diabetic man knows that his family will pick up his insulin whenever he needs it, his perceived medication stress will be lower than if he didn't have his family to count on to do this for him. Also, for example, if the same diabetic man knows that his pharmacist will have his kind of insulin in the drug store when he needs it, the patient's perceived medication stress may be lower, contributing to better medication adherence. Finally, for example, if the same diabetic man knows that his doctor will schedule an appointment will him when he is experiencing a problem with his insulin medication, the patient's perceived medication stress may be lower, contributing to better medication adherence.

When social support exhibits a moderating effect on the relationship between medication-related stressors and perceived medication stress, the medication-specific social support will have a beneficial effect only if the medication-specific social support offered to the individual is high enough to help that person deal with the medication-related stressor he or she is experiencing. In this situation, medication-specific social support will require a higher level of effort to have a beneficial effect. For example, the same man's pharmacist may need to instruct this diabetic man on the use of a new electronic blood glucose monitor. It may take more than one counseling session with the pharmacist to bring the man's perceived medication stress level down. By offering more medication-specific social support to the patient to help him deal with this medication-related stressor he is experiencing often, the extra time spent is not only prudent but necessary.

In the present study, medication-related stressors, perceived medication stress, and medication-specific social support will take on specific meanings. Medication-related stressors will represent the patient's experience with problems related to his or her medication regimen. For example, an elderly man may state that very often he has needed something to remind him to take his medications on time. Perceived medication stress will represent the patient's evaluation of his or her experiences with these medication-related stressors. For example, an older man may assert that he feels very discouraged with his complex medication regimen. Medication-specific social support will represent the patient's perception of services received from a doctor, pharmacist, or "most concerned" other person, which may help the patient deal effectively with medication-related stressors or perceived medication stress. For example, an elderly man may declare that his wife shows little or no concern about his feelings of discouragement with his complex medication regimen. All these factors may influence his decision to not adhere to his medications.

This exploratory, cross-sectional, retrospective study will investigate only variables in the "nucleus" of the proposed model. The dependent (outcome) variable will be medication adherence. The independent (predictor) variables will be medication-related stressors and medication-specific social support. Perceived medication stress will be either a dependent or independent variable depending on the context in which it is used.

An important goal of the proposed study will be to better understand the relationships among the variables of the nucleus of the model and, thus more clearly define the basic premises of model. Other variables and relationships, although interesting, will be reserved for subsequent studies. This present focus raises two research questions which will follow.

Research Questions

Relationships between four key constructs in the "nucleus" of the proposed Stress Model of Medication Adherence (SMMA-n) will be the prime focus of this research. These four constructs are medication adherence, medication-related stressors, perceived medication stress, and medication-specific social support. When this task has been accomplished, two "overarching" research questions can be addressed, which are as follows:

1. Does perceived medication stress have a main effect, mediating effect, or combination of these effects on the relationship between medication-related stressors and medication adherence?

2. Does medication-specific social support have a main effect, moderating effect, or combination of these effects on the following two relationships: 1.) the relationship between medication-related stressors and perceived medication stress, and 2.) the relationship between perceived medication stress and medication adherence?

Summary

This chapter described both a stress model and an adapted one: the Stress Model of Medication Adherence (SMMA). The proposed study will only examine variables that form the "nucleus" of the proposed Stress Model of Medication Adherence (SMMA-n). The nucleus of the model is important because it is there that the consequential impact of perceived medication stress and medication-specific social support can be measured. An investigation of the nucleus of the proposed model will require a thorough review of the psychological, sociological, and medical practice literature germane to the variables and their inter-relationships. In the next chapter, past studies on the conceptualization and measurement of medication adherence, stressors, perceived stress, and social support will be examined.

CHAPTER 3
REVIEW OF THE LITERATURE

Introduction

In this chapter, literature relevant to the nucleus of the proposed Stress Model of Medication Adherence (SMMA-n) will be reviewed. During this review, it will become apparent that some of the variables in the proposed model have already undergone some development, whereas other variables still need a great amount of research. This makes the original, or parent, stress model (Israel and Schurman, 1990) challenging to adapt to the medication-taking experiences of the elderly. The handful of studies that will be reviewed here have used portions of the proposed model and, on the surface, seem to have conflicting results. However, when linking each of these studies using the proposed model, it will become clear that each study offers a piece of the puzzle which, when put together, will help us understand the more important relationships among the variables in this study's proposed model.

During this study, four variables will be utilized, and the more important relationships among them will be elucidated. Medication adherence will be a dependent variable; whereas, the independent variables will be medication-related stressors and medication-specific social support. Perceived medication stress will be either a dependent variable or independent variable according to the context in which it is used.

This chapter will begin with a discussion on medication adherence. This discussion will focus on the only study linking medication adherence to stressors and perceived stress. After a discussion of the positive and negative aspects of this study, an argument for the development of a more specific stressor scale will be made to improve the prediction of medication adherence among elderly outpatients.

Next, this chapter will continue with a large section devoted to medication-related stressors. This large deliberation will be divided into two distinct sections. First, a review of the psychosocial literature germane to the historical evolution of general stressor constructs will be addressed. Second, the development of an improved medication-related stressor scale will be discussed. The argument will be made that the construct of medication-related stressors needs to be expanded to include both subjective and objective categorizations. The subjective category of medication-related stressors will include patient-reported measures of these stressors. These subjective medication-related stressors will be initially subclassified into informational, emotional, or instrumental categories. The objective category of medication-related stressors will be an impartial measure of these stressors taken from automated records, that is, the patient's number of prescribed medications.

Next, this chapter will continue with a discussion on perceived medication stress. This section will begin with a review of the literature germane to the historical development of the general perceived stress construct. This discussion will conclude with a review of scales which have been developed. The use of a perceived medication stress scale in the proposed study will aid not only in the elucidation of the proposed model, but also in the validation of the improved medication-related stressors construct.

This chapter will then continue with a discussion on medication-specific social support. This section will conclude with a section on statistical relationships that have been elucidated among stressors, social support, perceived stress, and outcome variables in other similar (but more general) studies. By reviewing the literature on each of these variables and describing relationships that may exist among them, the two overarching research questions from Chapter 2 will be translated into five sets of research hypotheses suggested by the "magnified" nucleus of the proposed Stress Model of Medication Adherence (SMMA-n). A summary will conclude this chapter.

Medication Adherence

"[Adherence is] the extent to which a person's behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice (Haynes,1979)." Unfortunately, elderly outpatients seem to experience multiple socio-medical problems that make high medication adherence rates difficult to achieve (Richardson, 1986; Entwhistle, 1989).

Medication adherence has been studied as an outcome variable in only one quantitative "stress model-like" study found in the literature. In this study, a group of investigators (Frenzel et al., 1988) found no link between a general daily hassles (stressors) scale (Kanner et al., 1981) and medication adherence. But, the study does seem to suggest that the development of a more "refined" daily hassles (stressors) measure tailored to medication use might be useful for demonstrating an association between medication-related stressors and medication adherence. This same investigation successfully demonstrated a link between perceived stress and medication adherence using a perceived stress scale developed by Cohen, Kamarck, and Mermelstein (1983). However, they did not investigate the effects of social support on the relationship between stressors and perceived stress and the relationship between perceived stress and medication adherence.

The findings from the study by Frenzel et al. (1988) suggest that "general" stressors have an effect in the hypothesized direction on perceived stress. This opens the door to the use of the model proposed in this study using more specifically defined stressors. However, to move forward will require the development of a more specific construct to supplant the more general daily hassles scale.

Medication-related Stressors

The discussion on medication-related stressors will be divided into two sections. The first section will review the historical evolution of general stressor constructs. The second section will discuss the development of an improved medication-related stressor scale.

Historical Evolution of General Stressor Constructs

There have been various attempts to evaluate the role of stressors using life events scales and daily hassles scales. It will be important to explore the differences between these two types of scales in order to develop a medication-related stressor construct that can be helpful in predicting medication adherence.

In the past, studies on the role of stressors have been approached from a major life events perspective (Holmes and Rahe, 1967; Dohrenwend and Dohrenwend, 1974). Although much of this research has been criticized on methodological grounds (Mechanic, 1974; Sarason, Johnson and Siegel, 1978), it does provide consistent evidence for a link between social events and health disorders (Brown and Harris, 1978). Increased scores for major life events have been found to be related to dysfunction both retrospectively and prospectively (Monroe, 1983). However, the magnitude of the association found between major life events and health disorders has frequently been low (Sarason, de Monchaux, and Hunt, 1975; Rabkin and Struening, 1976).

In an attempt to improve this prediction, recent research has incorporated measures of everyday events, such as hassles. Lazarus and Folkman (1984) focused on everyday events or hassles as an alternative measure of stressors. Hassles are envisioned by Lazarus and Folkman (1984) as experiences and conditions of daily living that have been appraised as salient and harmful or threatening to the endorser's well-being.

Although daily hassles have been found to be correlated with major life events (Kanner et al., 1981; Monroe, 1983), when the effects of both types of stressors were examined jointly, hassles were found to be a better predictor of dysfunction than major life events. Kanner et al. (1981) found daily hassles to outperform major life event scores as predictors of both current and subsequent symptoms. DeLongis et al. (1982) obtained essentially the same result using health status as the outcome variable. Both studies found hassles and outcomes to be significantly correlated when the effects of major life events were examined using partial correlation. However, when the partial correlation did not include hassles, major life events and outcomes were found to be unrelated. This finding has been replicated using different measures of hassles (Monroe, 1983; Burks and Martin, 1985) and different health outcome measures (Weinberger et al., 1987).

When the "original" Hassles Scale (Kanner et al., 1981) was published, the scale aroused considerable debate for two reasons. First, some critics contended that the Hassle Scale was confounded by an inability to separate the external, objective sources of stress from the internal, subjective reactions to it and that it measured, rather than predicted, perceived stress (Dohrenwend et al., 1984). Second, critics also contended that respondents were asked to endorse Hassle Scale items as having been "somewhat," "moderately," or "extremely" severe; there was no provision for rating a particular hassle as being "less than somewhat severe." They contend that, because of this format, endorsement of Hassle Scale items indicates difficulty in coping with the stressors mentioned in the items (Dohrenwend and Shrout, 1985).

In a newer instrument, the Survey of Recent Life Experiences, Kohn and Macdonald (1992) addressed both criticisms of the Hassles Scale for the general adult population. First, their item-selection strategy was to retain only items which correlated positively and significantly with Cohen et al.'s (1983) "gold standard": The Perceived Stress Scale. In this way, they ensured that the final form of the Survey of Recent Life Events would retain an indirect relationship to the stress-appraisal process, which Lazarus and his associates maintained is a critical determinant of the adverse consequences of stress (e.g., Kanner et al., 1981; DeLongis et al., 1982; Lazarus and Folkman, 1984; Lazarus, 1984; Lazarus et al., 1985). They adopted this "indirect approach" to avoid the potential contamination inherent in the Kanner et al. (1981) method of tapping into stress appraisal, namely the use of severity ratings. Instead of having subjects rate each item for its severity, they had them indicate the extent of their experience with it over the past month. Second, they included another point in the Survey of Recent Life Experiences to denote no experience with hassles, as such addressing the second shortcoming alluded to earlier in the original Hassle Scale by Kanner et al. (1981).

Although the "general" Survey of Recent Life Events is a significant advance in hassle research, the development of special hassles measures for specific subgroups of the general population is clearly justified by substantial differences in the frequency of endorsement of various hassles among them (Kanner et al., 1981; Blankstein and Flett, 1991). This is why special scales have been developed to assess hassles among children (Elwood, 1987; Kanner et al., 1987), adolescents (Bobo et al., 1986; Compas et al., 1987), medical students (Wolf, Elston, and Kissling, 1989), college students (Blankenstein and Flett, 1991; Kohn et al., 1990), computer users (Hudiburg, 1991) and, in the health care field, patients on hemodialysis treatment for end-stage renal disease (Murphy, Powers, and Jalowiec, 1985).

Implicit in this view is the expectation that hassles will differ even within subgroups, reflecting their particular interpersonal and social contexts. It seems plausible that men and women, older and younger people, and individuals with different roles would report quite different hassles as a consequence of their personal situations. Furthermore, if hassles are to be a viable alternative to the major life events approach, they need to be predictive of significant outcomes, such as medication adherence.

Development of the Medication-related Stressors Construct

The notion of a "hassle-like" scale specific to medication use is not new. Medication-related stressors have been the focus of at least one qualitative study and two quantitative studies. However, by reviewing these related studies, an argument will be made for the development of an improved quantitative medication-related stressor scale that includes not only patient-reported measures of experiences with these stressors, but also an objective measure of these stressors taken from automated records.

One qualitative study has looked at the contribution of medications to stress among family caregivers and the need of caregivers for services provided by a pharmacist (Ranelli and Aversa, 1994). An interview was designed to elicit information about stressors stemming directly from the medications (such as adverse effects) and arising from problems in managing the drug regimen (such as medication adherence), services received from health care providers (such as services received from the pharmacist), and the outcomes of stress (such as the caregiver's satisfaction with services). Medications were found to contribute substantially to caregivers' stress, with 32% of the caregivers reporting problems directly related to medications (primary medication-related stressors) and 19% and 52% reporting problems in managing the drug regimen (secondary medication-related stressors) currently or within the past year, respectively.

Two quantitative studies have looked at the contribution of medications to stress among patients suffering from schizophrenia (Weiden et al., 1994; Harvey, 1991). Weiden et al. (1994) constructed and validated a hassle "like" instrument specific to takers of lithium as part of a larger scale called the Rating of Medication Influences (ROMI). The ROMI was developed as part of a longitudinal study of neuroleptic nonadherence and was administered to 115 discharged schizophrenia outpatients. A principal components analysis of the "Reasons for Noncompliance" items yielded five subscales related to nonadherence (Denial/Dysphoria, Logistical Problems, Rejection of Label, Family Influence, and Negative Therapeutic Alliance). The authors concluded that the multidimensional aspects of the instrument make it ideal for research studies addressing the various reasons for medication nonadherence among schizophrenia outpatients. These five subscales do have a distinct advantage over the earlier unidimensional quantitative scale, the Lithium Attitudes Questionnaire (LAQ: Harvey, 1991). However, both of these scales are specific to patients suffering from schizophreniza and cannot be used as a more general scale for elderly outpatients suffering from one or more chronic conditions.

After a thorough examination of studies involving one or more medication-related stressors, it appears in general that subjective experiences of medication-related stressors can be subclassified (at least initially) into informational, instrumental, or emotional categories. Each of these categories, and the studies that suggest the specific subjective experiences of medication-related stressors within each category, will be addressed in turn.

Informational medication-related stressors represent the patient's subjective experience of a subgroup of problems, irritants, or annoyances stemming from a lack of facts about the particular medication(s) he or she is taking, or the medical condition(s) he or she is experiencing. Nine "informational" medication-related stressors were identified in the medical literature. First, patients appear to have problems when they don't feel right, attribute it to their medication, and wonder about changing the dose of their medication. This has been seen in patients taking medication(s) for convulsions (Reynolds, 1978), nausea (Laszlo, 1983), angina (Scardi, 1989), sedation (Rhodes et al. , 1978), diabetes (Paterson et al., 1989), anxiety (Henderson, 1982; Hellerstein et al., 1994), hypertension (Tunca and Agzitemiz, 1993), tuberculosis (Castelo et al., 1989), blood clots (Silva-Smith, 1994), psychosis (Salzman, 1993) and depression (Gram, 1990). Second, patients seem to have trouble choosing the appropriate nonprescription medication. This has been shown, for example, among patients taking laxatives (Bruppacher et al., 1988), and antacids (Gerbino and Gans, 1982). In fact, the problems among the elderly with nonprescription use has become so problematic that it has been advocated that counseling by pharmacists (Bayne et al., 1983) be augmented with help from social work practitioners (Giannetti, 1983) and trained volunteers (Fabacher et al. 1994). Third, patients appear to need information about how their medication interacts with other medications (Stewart and Cooper, 1994; and Silva-Smith, 1994), food (McCabe, 1986) and/or beverages (Lamy, 1984). Fourth, patients need information regarding the administration of eye drops (Smith and Drance, 1984) and metered-dose inhalers (Reardon and Bragdon, 1993; Clark, 1994), as well as the more common liquids, suppositories, and ointments (Anderson, 1977). Fifth, patients can undergo pressure when they do not know whether something that happens to them is a side effect of their medication. For example, medication adherence has been found to dramatically fall when patients suddenly complain of a change in sexual behavior (Papadopoulos, 1980; Strauss and Gross, 1984), or a change in taste (Coulter, 1988). Sixth, patients can feel anxiety when they do not know what to do when a side effect of their medication occurs. For example, patients often do not know that simple irritation of the skin from transdermal patches (Rayment et al., 1985; Carmichael, 1994), often doesn't require the changing of the prescription, whereas side effects from antidepressants often do (Somberg, 1984; Agosti et al., 1988; Stokes, 1993). Seventh, patients can experience a great deal of strain when they constantly miss doses of their medication. Often this will necessitate a change to drugs with more convenient dosage schedules (Ram and Featherston, 1988; Slinning, 1990; and Bialer, 1992), rather than the usage of depot administration (Barnes and Curson, 1994). Eighth, patients can become bewildered wondering whether a medication given to them by one physician should be taken with a medication given to them by a different physician (Lamy, 1989; Colley and Lucas, 1993; Kirchner, 1994). And, finally, ninth, patients may think or believe that their medication is not working. For example, patients taking anticonvulsants (Reynolds, 1978) and patients takings antiemetics (Lazlo, 1983) may complain that they are uncertain about their drug's efficacy and need more information.

Instrumental medication-related stressors represent the patient's subjective experience of a subgroup of problems, irritants, or annoyances stemming from a felt incapacity to acquire his or her medication(s) or items necessary to take his or her medication(s) correctly. Nine "instrumental" medication-related stressors were identified in the medical literature. First, elderly patients can experience difficulties getting transportation to a doctor's office and/or pharmacy (Wolfgang et al., 1993). These difficulties are compounded with problems involving opening hours (Crespo et al., 1992), physical disability (Smith and Drance, 1984), and uncommonly stocked medications (Miller, 1981; Burns et al., 1992; Rabon et al., 1993; Carlsson et al., 1993). Second, patients may need something to remind them to take their medications on time (Carswell, 1985; Fingeret and Schuettenberg, 1991; Rivers, 1992; Mackowiak et al., 1994; Spiers and Kutzik, 1995). Third, patients can need something to remind them to have their medications refilled on time (Smith et al., 1986). Fourth, patients can experience trouble having their blood pressure taken (National High Blood Pressure Education Program, 1983; Lebrec, 1990; Mejia et al., 1990; Costa, 1994; Schultz and Sheps, 1994) or some other type of monitoring, for example, drug levels in the blood (Reynolds,1978; Risch et al., 1979; Troupin, 1984; Squire et al., 1984; Ritschel et al. 1989; Javaid, 1994; Silva-Smith, 1994), peak-expiratory flow rates (Stafford, 1988), and occult blood testing (Simon, 1987). Fifth, patients may need an up-to-date list of their medications to show to all their doctors (Smith, 1994). Sixth, patients need to have easy-to-read information about their medications because they often do not receive or remember enough from their conversations with health-providers (Lee and Tan, 1979; Smith et al., 1986; Morrow et al., 1988). Seventh, elderly patients often have difficulty opening their medication containers (Schlumpf and Sonderegger, 1981; King and Palmisano, 1989; Burns et al., 1992). Eighth, elderly patients can have difficulty swallowing their medication and may need a suspension compounded (Sarkar et al., 1989; Andersen et al., 1995). And, finally, ninth, patients can have problems paying for their medication (Leppik, 1990; Shea et al., 1992).

Emotional medication-related stressors represent the patient's subjective experience of a subgroup of problems, irritants, or annoyances stemming from a felt inability to deal with feelings about his or her medication(s) or his or her medical condition(s). Nine "emotional" medication-related stressors were identified in the medical literature. First, patients can presume that no one is really interested in their health. The impact of discussion which demonstrates patient interest by the health provider has been shown to be positively associated with patient medication adherence (Martin and Bass, 1989). Second, patients can feel afraid that no one can help them deal with their health problems. Without discussion on patient attitudes and expectations about their therapy, patients cannot hope to have realistic goals and may feel forsaken (Massey et al., 1980; Leppik , 1990; Ranz et al., 1991; Unger, 1995; Donovan, 1995). Third, patients can lack confidence about taking their medication as prescribed. Techniques to improve patient confidence have repeatedly demonstrated a positive impact on medication adherence (Jones, 1976; Miller, 1981; Forman, 1985; Webb et al., 1990; Nespor, 1993; Miller, 1993; Lilja and Larsson, 1994; Costa, 1994; Robinson et al., 1995). Fourth, patients can feel embarrassed about taking their medications. These embarrassments may include problems with literacy (Hussey, 1991), urinary incontinence (Vernon, 1989), sexual inadequacies (Aizenberg et al., 1995), epilepsy (Krumholz et al., 1989), and body disfigurements (Stewart, 1983). Fifth, patients can feel that no one seems to listen to them about dealing with their medication problems (King et al., 1986). Sixth, patients can feel afraid to ask someone to make something that was told to them about their medication easier to understand. For this reason, physicians are shifting away from a rigid authoritative manner when speaking with their patients (Martindale, 1990) to using a more collaborative manner (Heaton, 1981; Larsen et al., 1985; Laage, 1988; Rost et al., 1989) which has been shown to have a positive impact on medication adherence among schizophrenics (Ranz et al., 1991), diabetics (Schifferdecker et al., 1994), and hypertensives (Schultz and Sheps, 1994; Kjellgren et al., 1995). Seventh, patients can feel judged because of the medications they take. Emotional counseling that includes respect and acceptance of the patient's condition must accompany medication therapy (Lieberman and Evans, 1985; Vinson and Cooley, 1993). Eighth, patients can experience a side effect of their medication that upsets them (Papadopoulos, 1980; Strauss and Gross, 1984). Ninth, patients can feel no need to take their medication. This often occurs when a patient suffers from a condition in which there are no readily discernable symptoms, as for example, hypertension (Nies, 1975; Moser, 1985; Black, 1990; Fotherby, 1995), or they suffer from a condition that renders them unable to discern such symptoms, as for example, depression (Guscott and Grof, 1991.)

Also from this thorough review of the literature, one might argue that there is an objective measure of medication-related stress which act in unison with these subjective medication-related stressors to affect perceived medication stress. Specifically, there are the patient's number of prescribed medications. From the literature review, studies of drug use consistently show a negative relationship between the number of drugs taken by the patient and medication adherence (Weintraub, Au, and Lasagna, 1973; Hulka, Kupper, Cassel, and Efird, 1975; Darnell et al., 1986).

In this segment on medication-related stressors, two literature reviews were accomplished: 1) a review of the psychosocial literature germane to the historical evolution of general stressor constructs, and 2) a review of the medical literature to make the argument that the medication-related stressor construct needs to include both a subjective and an objective scale and that the subjective stressors should be subclassified into three categories: informational, emotional or instrumental. Both of these reviews will help in the conceptualization and construction of a new medication-related stressors scale.

Perceived Medication Stress

In this section, there will be a review of the literature germane to the historical development of the perceived stress construct. It will be argued that, although historically difficult, a distinction must be made between the experience of stressors and a patient's evaluation of those experiences. It will also be argued that perceived stress may have either main (direct) effects or mediating (indirect) effects on the relationship between stressor experience and medication adherence.

Perceived stress may arise when an individual perceives that it is important to respond to one or more of the hassles, but an appropriate response is not immediately available (Lazarus and Launier, 1978). Although a stressor may not place great demands on the abilities of most individuals, it is when multiple stressors accumulate, persisting and straining the problem-solving capacity of the individual, that the potential for serious perceived stress may occur (Wills and Langer, 1980).

Patients actively interact with their environments, appraising potentially threatening or challenging experiences (Lazarus, 1966, 1977). From this perspective, stressor effects are assumed to occur only when both 1) the experience is evaluated as threatening or otherwise demanding and 2) insufficient resources are available to deal with the experience. The argument is that the causal "event" is the emotional response to the stressor experience (Lazarus, 1977). An important part of this view is that the response to the experience is influenced by conditioning factors as well, such as social support.

The centrality of this evaluation process suggests the desirability of measuring perceived stress in addition to the experience of stressors. If perceived stress is measured, it could also be used in conjunction with a medication-related stressors scale in an effort to determine whether such factors as social support (Pearlin et al., 1981) protect people from the deleterious effects of stressors by altering the process or processes by which the evaluation of these experiences result in behavioral changes (Gore, 1981). Also, perceived stress can be viewed as an outcome variable measuring the level of perceived stress as a function of medication-related stressors.

Measures of the evaluation of specific stressor experiences have been widely used, for example, measures of perceived occupational stress (Kahn et al., 1964). There are, however, some practical and theoretical limitations of measuring evaluations to specific stressors. Practically, it is difficult and time-consuming to adequately develop and psychometrically validate an individual perceived stress measure every time a new stressor is studied. Theoretically, there is an issue of whether measures of perceived stress to a specific stressor really assess a person's evaluation of that stressor. There is, in fact, evidence that people often wrongly attribute their evaluations of stress to a particular source when the perceived stress is actually due to another source (Gochman, 1979). Another problem with measures of evaluation to specific stressors is that such measures imply the independence of that experience in the precipitation of an outcome. However, it is likely that the outcome process is affected by a combination of specific stressors that may be measured by a "global" measure of these stressors.

Cohen, Kamarck, and Mermelstein (1983) presented evidence from three samples, two of college students and one of participants in a community smoking-cessation program, for the reliability and validity of a 14-item instrument, the Perceived Stress Scale, designed to measure the degree to which situations in one's life are evaluated as stressful. The Perceived Stress Scale showed adequate reliability and, as predicted, was correlated with major life event scores, depressive and physical symptomatology, utilization of health services, social anxiety, and smoking-reduction maintenance. In all comparisons, the Perceived Stress Scale was a better predictor of the outcome in question than were major life events scores. In the years to follow this study, the Perceived Stress Scale became the gold standard for measuring perceived stress in other studies (e.g., Linn, 1985; Levenstein et al., 1993). In two studies examining the multi-dimensionality and internal consistency of the Perceived Stress Scale (PSS: Hewitt et al., 1992; and Martin et al., 1995), it was established that the PSS consisted of two factors. The first factor appears to measure global feelings of stress arising from perceptions that one's life is stressful, unpredictable, uncontrollable, and overloading. As suggested by Hewitt et al. (1992), "perceiving oneself as stressed may involve a perception of one's ability to deal effectively with events or changes." The second factor appears to assess perceptions of an ability to cope with stressors in one's life. As suggested by Hewitt et al. (1992), "perceiving oneself as stressed may involve a negative affective experience reaction."

These general studies on perceived stress point us in the direction we need to go: a perceived stress scale specific to medication use will have to be utilized. This kind of scale must be utilized to test two effects: 1.) the effect of medication-specific social support on the relationship between medication-related stressors and perceived medication stress, and 2.) to test the effect of medication-specific social support on the relationship between perceived medication stress and medication adherence.

However, it may be as important or more important to understand the relationship than underpins the entire model, that is, how perceived medication stress effects the relationship between medication-related stressor experience and medication adherence. A recent study has demonstrated that neuroticism has significant direct effects on all health outcomes, and substantial indirect effects, through perceived stress, on mental health outcomes (Hooker et al., 1992). This might suggest that the experience of medication-related stressors while taking multiple medications might have direct effects on medication adherence, and substantial indirect effects through perceived medication stress, on medication adherence.

The central idea in a mediation model is that the effects of stimuli on behavior are mediated by various transformation processes internal to the organism (Baron and Kenny, 1986). Perceived medication stress can represent a property of the person that transforms a predictor by some "in the head" mechanism. And, it must be understood that mediating events "shift roles" from effects to causes, depending on the focus of the analysis. Therefore, during one part of the study, perceived medication stress will be treated as an independent variable having an effect on medication adherence, while during another part of the study it might be thought of as being acted upon (as a dependent variable) by medication-related stressors.

Medication-specific Social Support

Medication-specific social support was identified as a "social" conditioning variable (Israel and Schurman, 1990). Social support has been defined as "an input directly provided by another person (or group) which moves the receiving person towards goals which the receiver desires (Caplan et al., 1976)." There is evidence that supportive interactions among people are protective against the health consequences of life stress.

Several prospective epidemiological studies have shown that increases in "global" social support are related to decreases in mortality. This was shown in 9- to 12-year prospective studies of community samples by Berkman and Syme (1979) and House, Robbins, and Metzner (1982) and in a 30-month follow-up of an aged sample by Blazer (1982). Similarly, several prospective studies using mental health outcome measures have shown a positive relation between social support and mental health (Henderson, Byrne, and Duncan-Jones, 1981; Holahan and Moos, 1981; Turner, 1981; Williams, Ware, and Donaldson, 1981; Aneshensel & Frerichs, 1982; Billings and Moos, 1982).

In 1983, Levy presented a selective review and critique on social support as a factor in the enhancement of a different outcome measure--medication adherence. Regarding the integrity of the independent variable of social support, Levy suggested that future research should clearly specify the form of social support in the home, in training sessions, and in support groups. Levy stated that it may be necessary to devise instruments that will enable investigators to monitor "the kind and rate of social support" in several situations, such as support from family and friends. In other words, Levy has suggested that past studies have lacked an adequate detailing of the social support variable because they utilized primarily a "structural" perspective along the "structural-functional continuum." It appears that future investigators should make the shift from the "structural" perspective to the "functional" perspective.

Two comprehensive reviews in the sociological literature (Caldwell and Reinhart, 1988; Oxman and Berkman, 1990) suggest that to utilize the "functional" perspective, one should consider at least three functional domains of social support (i.e., appraisal, emotional, and tangible). These studies suggest that these three functional domains categorize the majority of support functions and that future studies using this typology could add significantly to this body of research.

It seems reasonable to assume that many studies in medical practice have been concerned with the domain of "appraisal" support, whereas studies in the social support literature involving caregivers or confidantes are concerned with the domains of "emotional" or "tangible" support. This is borne out in the only scale identified in the literature that has been used to study the effect of social support on medication adherence (Caplan et al., 1980).

Although some studies have provided evidence of a relationship between functional social support and outcomes, in theory this effect can be explained through very different processes. Social support seems to have two sorts of health effects: 1) a main or direct effect (e.g., Kessler and Essex, 1982), and 2) a moderating or buffering effect (e.g., Henderson, 1980; Wilcox, 1981). The main effect model proposes that social support has a beneficial effect regardless of whether persons are under stress. The moderating effect model proposes that social support will act only to protect people from the deleterious effects of stress on health and well-being when the patient is experiencing stressors. Both of these types of effects will be discussed in turn.

A generalized beneficial effect of social support is hypothesized to occur because it provides people with regular positive experiences as well as a socially rewarded role (Kessler and Essex, 1982). This kind of support could be related to the overall well-being of the person because it provides positive effects, a sense of predictability and a stability in one's life situation, and a recognition of self-worth. Integration in a network that provides some minimum level of social support may also provide resources to cope with stressors and help one avoid negative experiences that otherwise would increase the probability of an enduring negative outcome.

This view of social support in general has been conceptualized from a sociological perspective as "embeddedness" in social roles (Thoits, 1985) and, from a psychological perspective, as social interaction, social integration, relational reward, or status support (Wills, 1985). This kind of network is hypothesized to be related to physical outcomes through emotionally induced effects on neuroendocrine or immune system functioning (Jemmott and Locke, 1984) or through an influence on health-related behavioral patterns that might include cigarette smoking, alcohol use, or medical help-seeking (Wills, 1983; Krantz, Grunberg, and Baum, 1985).

Shifting to an examination of the moderating (buffering) effects model, social support may moderate between the stressor, or expectation of the stressor, and perceived stress by preventing high levels of perceived stress. That is, the perception that another individual can and will provide necessary resources may redefine the potential for harm posed by the experience of a stressor and bolster one's perceived ability to deal with the imposed experience of a stressor, and hence prevent a particular stressor experience from being evaluated as highly stressful (Cohen and McKay, 1984).

Literature reviews reveal that the relevance of the type of social support to a particular stressor experience may also determine the likelihood of observing a moderating effect (e.g., House 1981; House and Kahn, 1985; House et al., 1988; Cohen and Willis, 1985). In 1984, Cohen and McKay published a study on their Interpersonal Support Evaluation List (ISEL). Basically, they did not find a moderating effect with a tangible social support subscale. The lack of evidence for a moderating effect for the tangible social support subscale suggests that tangible aid is not an important resource for buffering. However, they did find a moderating effect for an emotional social support subscale and for an appraisal social support subscale.

This research seems to suggest that informational medication-specific support from a doctor, pharmacist, or (most concerned) other person will demonstrate a moderating effect on the relationship between medication-related stressors and perceived medication stress. Also, this research seems to suggest that emotional medication-specific support from a doctor, pharmacist, or (most concerned) other person will demonstrate a moderating effect on the relationship between medication-related stressors and perceived medication stress. However, this research seems to suggest that tangible medication-specific support from a doctor, pharmacist, or (most concerned) other person will demonstrate a main effect on perceived medication stress rather than moderating effect on the relationship between medication-related stressors and perceived medication stress.

Given that perceived medication stress is an evaluation of his or her responses to medication-related stressors, it will be hypothesized that only emotional medication-specific support can effect the relationship between perceived medication stress and medication adherence. Furthermore, it will be hypothesized that emotional medication-specific support from a doctor, pharmacist, or (most concerned) other person will demonstrate a moderating effect on the relationship between perceived medication stress and medication adherence.

Other Conditioning Variables

In the proposed model, there are six other conditioning variables in the nucleus of the Stress Model of Medication Adherence. Two variables are other social conditioning variables: income and ethnicity. The other four variables are biophysical conditioning variables: age, gender, and health status. Since the study sample will be taken from an older veteran population, ethnicity and gender were expected to not vary much from white males and these variables will be excluded from discussion here. It is hypothesized that the other conditioning variables will have some direct effects on medication-related stressors, perceived medication stress, and medication-specific social support. These hypotheses will help validate the "nucleus" of the proposed Stress Model of Medication Adherence and are expressed below.

Age

Advanced age should not be associated with medication nonadherence. Spiers and Kutzik (1995) found, among independently living persons at least 55 years of age participating in a "brown-bag" medication review, that age was the best predictor of medication-related problems. However, contrary to what is often believed, as a group these patients try harder to comply with medications in general and antihypertensive medications in particular than do younger patients (Klein, 1988), even in the presence of bothersome problems.

Advanced age should be positively associated with instrumental medication-related stressors. Subjects with advanced age suffer from declines in activities of daily living and might experience more stressors involving getting and taking their medications (Doherty et al., 1983). Older adults seem to experience motor difficulties that are problematic to obtaining or doing mechanical tasks associated with their medications. In one study, almost half of the noninstitutionalized elderly were found limited in mobility because of chronic conditions, especially heart disease and arthritis (Rice and Estes, 1984). Decreased activity and dexterity can limit a person ability and willingness to have prescriptions filled, take difficult to swallow drugs regularly, and open and close the childproof containers that, to arthritic hands are unmanageable (Mallet, 1992). There are age-related changes in vision, hearing, memory and learning (Kimberlin, 1995). In a study by Meyer and Schuna (1989), Jacob's Cognitive Capacity Screening Examination (CCSE) was utilized successfully to assess skills including the ability to read and interpret prescription labels, open and close vials, remove tablets, and identify tablet colors.

Advanced age should be positively associated with informational medication-related stressors. Older adults seem to experience difficulties with information when taking their medication. A study suggests that the failing eyesight of older adults reduces their ability to read small print on prescription labels and package inserts (Dirckx, 1979). Also, another study suggests that about 30% of the population aged 65 years and older suffer significant hearing loss (National Center for Health Statistics, 1985). Hearing loss limits patients' ability to hear directions for appropriate drug use and discourages them from asking questions (Ebersole and Hess, 1981). Also, the concept of "intelligent noncompliance" may be of special relevance to the elderly lacking proper information, for older people may omit medications in order to compensate for physiological changes accompanying aging or disease - changes that make them more vulnerable to adverse drug reactions that may be unrecognized by their physicians (Lipton and Lee, 1988). Furthermore, memory of information has been shown to decline with age and information may have to be repeated by the health care provider during each visit (Light, 1991; Salthouse, 1991).

Pharmacokinetic and pharmacodynamic effects may be altered in the patient as he or she ages (Hoffler, 1981; Braverman, 1982; Roberts and Turner, 1988; Dawling and Crome, 1989; Fox and Auestad, 1990; Taylor, 1990). There may be changes in the absorption of orally administered drugs, body composition, serum albumin and globulin concentration, cardiac output and hepatic metabolism, renal blood flow and renal function and homoeostatic mechanisms (Shaw, 1982;

Chapron, 1995). For example, these changes are associated with adverse effects among the elderly from nonsteroidal anti-inflammatory drugs (Johnson and Day, 1991). Drugs which most often result in adverse reactions in the elderly have been developed (Goldberg and Roberts, 1983).

In addition to these physiologic changes there are a number of disease changes that occur with aging (Salzman, 1982; Tuck, 1988; Furberg and Black, 1988). For example, the incidence and prevalence of congestive heart failure increase exponentially with advancing age (Hunziker and Bertel, 1995). Also, gastrointestinal problems are very common in the elderly, which exacerbate oral medication adherence efforts (Levitan, 1989). Indeed, side effects occur and medication adherence seems to wain, as elderly patients suffer from concurrent existing illnesses, for example, diabetes and bronchitis (Dall, 1989).

Income

Higher income should be positively associated with medication adherence. Hattaway (1996) has reported the impact of the high cost of prescriptions on medication nonadherence among the elderly. In addition, the failure of Medicare to cover the cost of prescription drugs is widely perceived to be a primary factor in medication nonadherence (Arnold et al., 1995). However, it must be clear that in this study most subjects had service connected disabilities and did not have to pay for their medications (except for a $2.00 co-pay). The medication adherence rate might have be significantly different if the study was replicated where cost was a consideration.

Higher income should not be associated with perceived medication stress. One study has suggested a socioeconomic effect on perceived stress in work and nonwork environments (Bednar, Marshall, and Bahouth, 1995). However, it is interesting to point out that in another closely related study, an inverse relationship was found between economic satisfaction and perceived stress. It would seem that perceived stress has more to do with a person satisfaction with their economic situation than their actual income (Krannich, Riley, and Leffler, 1988).

Health Status

An association should not be found between poor health status (using self-rated health and Chronic Disease Score) and medication adherence. This has been suggested in a recent study among elderly patients taking one or more chronic medications (Coons et al., 1994).

Poor health status should be positively related to the informational medication-related stressors. Subjects with more disease states should be more concerned about their medication taking and information that has a bearing on their medication taking. These particular subjects will likely experience more stressors related to specific information gathering efforts. For some older patients, diabetes mellitus or renal functional impairment can effect sodium fluid volume retention, which requires concommitant dosage adjustments to avoid the appearance of side effects (Weidmann, 1983).

Poor health status should be positively related to the instrumental medication-related stressors. Subjects with more disease states would seem to experience more stressors involving getting and remembering to take their medications. Older patients with hip fractures have indicated having transportation problems (Harrison and Kuric, 1989), which suggests they can have difficulty getting medications refilled. Older patients with cancer have reported decreased functional status, fatigue, pain and psychologic distress, that result in instrumental difficulties continuing to take medications (Craig and Powell, 1987; Fossa et al., 1990).

Poor health status should be positively related to the emotional medication-related stressors. As a subject's health deteriorates, them seem to experience problems related to communicating with other people about their medications. Those in the age group 65 or over who rate their health as poor visit the doctor most and take more medication than those who rate their health as good (Linn and Linn, 1980). Certain affective disorders among the elderly are associated with compromised cognitive and emotional capacities and thus, with one's ability to act as a fully autonomous individual (Perry, 1985). These patients, presenting with psychiatric disorder coexisting with alcohol and/or drug abuse, present a major problem in treatment because of their emotional fragility, their propensity to impulsive acting-out behaviors and their adaptation to psychiatric symptomatology via self-medication with illicit drugs (Case, 1991). Recovering patients have complex attitudes and feelings toward medications that need to be explored, particularly as they affect adherence with prescribed regimens (Zweben and Smith, 1989). Major depression is associated with amplification of somatic symptoms and disability, poor self-care and adherence to medical regimens (Katon and Sullivan, 1990).

Poor health status should be negatively related to perceived medication stress (Chwalisz and Kisler, 1995). However, it should be noted that in a separate study, it was found that the strength of this association decreases over time (Schulz et al., 1995). This suggests that upon the first occurrence of one or more morbidities, a patient's perceived stress may be higher than it will be at a future point in time as he or she gets accustomed to living with their condition(s).

Research Hypotheses

The nature of the proposed research is exploratory. Nevertheless, based on this literature review, we now have a "magnified" view of the nucleus of the proposed Stress Model of Medication Adherence (see Figure 3.1). Five sets of hypotheses can now be stated. The first set of hypotheses deal with correlations between the exogenous and endogenous variables to help validate the "nucleus" of the Stress Model of Medication Adherence. The second set of hypotheses deal with hypothesized mediating effects of perceived medication stress on the relationships between type of stressors and medication adherence. The third, fourth, and fifth set of hypotheses deal with relationships between medication adherence, type of stressors, perceived medication stress and type of doctor, pharmacist, and (most concerned) other person support, respectively.

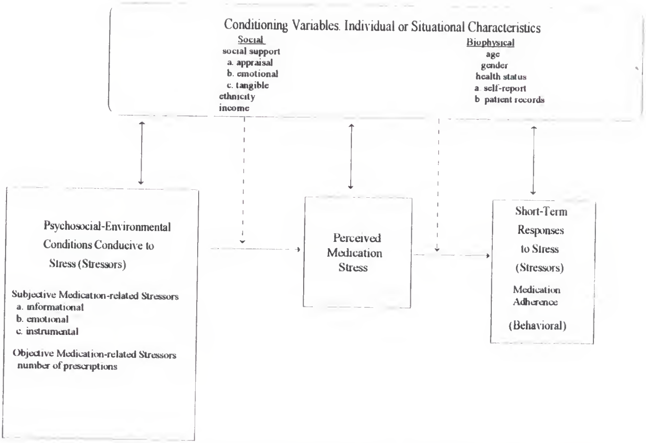

Conditioning Variables. Individual or Situational Characteristics
Social
social support
a. appraisal
b. emotional
c. tangible
ethnicity
income
Biophysical
age
gender
health status
a. self-report
b. patient records
Psychosocial-Environmental Conditions Conducive to Stress (Stressors)
Subjective Medication-related Stressors
a. informational
b. emotional
c. instrumental
Objective Medication-related Stressors
number of prescriptions
Perceived Medication Stress
Short-Term Responses to Stress (Stressors)
Medication Adherence
(Behavioral)

Figure 3.1 Magnified view of the "nucleus" of the Stress Model of Medication Adherence (SMMA-n)

First Set of Hypotheses

Hypothesis $1A_1$: Advanced age is not associated with medication adherence.

Hypothesis $1A_2$: Advanced age is positively associated with instrumental medication-related stressors

Hypothesis $1A_3$: Advanced age is positively associated with informational medication-related stressors.

Hypothesis $1B_1$: Higher income is positively associated with medication adherence.

Hypothesis $1B_2$: Higher income is not associated with perceived medication stress.

Hypothesis $1B_3$: Higher income is not associated with perceived medication stress.

Hypothesis $1C_1$: Poor health status is not associated with medication adherence.

Hypothesis $1C_2$: Poor health status is associated with informational medication-related stressors.

Hypothesis $1C_3$: Poor health status is associated with instrumental medication-related stressors.

Hypothesis $1C_4$: Poor health status is associated with emotional medication-related stressors.

Hypothesis $1C_5$: Poor health status is associated with perceived medication stress.

Second Set of Hypotheses

Hypothesis $2A_1$: There will be a positive main effect between informational stressors and perceived stress, a negative main effect between informational stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Hypothesis $2A_2$: There will be a positive main effect between emotional stressors and perceived stress, a negative main effect between emotional stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Hypothesis $2A_3$: There will be a positive main effect between instrumental stressors and perceived stress, a negative main effect between instrumental stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Hypothesis 2B: The associations between the exogenous and endogenous variables found earlier using zero order correlations may no longer be significant when using multiple regressions.

Hypothesis $2C_1$: There will be a mediating effect of perceived stress on the relationship between informational stressors and medication adherence.

Hypothesis $2C_2$: There will be a mediating effect of perceived stress on the relationship between emotional stressors and medication adherence.

Hypothesis $2C_3$: There will be a mediating effect of perceived stress on the relationship between instrumental stressors and medication adherence.

Third Set of Hypotheses

Hypothesis $3A_1$: There will be negative main effect between informational stressors and doctor's appraisal support, a positive main effect between informational stressors and perceived stress, and a negative main effect between doctor's appraisal support and perceived stress.

Hypothesis $3A_2$: There will be negative main effect between emotional stressors and doctor's emotional support, a positive main effect between emotional stressors and perceived stress, and a negative main effect between doctor's emotional support and perceived stress.

Hypothesis $3A_3$: There will be negative main effect between instrumental stressors and doctor's tangible support, a positive main effect between instrumental stressors and perceived stress, and a negative main effect between doctor's tangible support and perceived stress.

Hypothesis $3A_4$: There will be negative main effect between perceived stress and doctor emotional support, a positive main effect between perceived stress and medication adherence, and a negative main effect between doctor's emotional support and medication adherence.

Hypothesis 3B: The associations between the exogenous variables and doctor medication-specific social support variables found earlier using zero order correlations may no longer be significant when using multiple regressions.

Hypothesis $3C_1$: There will be a moderating effect of doctor appraisal support on the relationship between informational stressors and perceived stress.

Hypothesis $3C_2$: There will be a moderating effect of doctor emotional support on the relationship between emotional stressors and perceived stress.

Hypothesis $3C_3$: There will be a moderating effect of doctor tangible support on the relationship between instrumental stressors and perceived stress.

Hypothesis $3C_4$: There will be a moderating effect of doctor emotional support on the relationship between perceived stress and medication adherence.

Fourth Set of Hypotheses

Hypothesis $4A_1$: There will be negative main effect between informational stressors and pharmacist appraisal support, a positive main effect between informational stressors and perceived stress, and a negative main effect between pharmacist appraisal support and perceived stress.

Hypothesis $4A_2$: There will be negative main effect between emotional stressors and pharmacist emotional support, a positive main effect between emotional stressors and perceived stress, and a negative main effect between pharmacist emotional support and perceived stress.

Hypothesis $4A_3$: There will be negative main effect between instrumental stressors and pharmacist tangible support, a positive main effect between instrumental stressors and perceived stress, and a negative main effect between pharmacist tangible support and perceived stress.

Hypothesis $4A_4$: There will be negative main effect between perceived stress and pharmacist emotional support, a negative main effect between perceived stress and medication adherence, and a positive main effect between pharmacist emotional support and medication adherence.

Hypothesis 4B: The associations between the exogenous variables and pharmacist medication-specific social support variables found earlier using zero order correlations may no longer be significant when using multiple regressions.

Hypothesis $4C_1$: There will be a moderating effect of pharmacist appraisal support on the relationship between informational stressors and perceived stress.

Hypothesis $4C_2$: There will be a moderating effect of pharmacist emotional support on the relationship between emotional stressors and perceived stress.

Hypothesis $4C_3$: There will be a moderating effect of pharmacist tangible support on the relationship between reminding stressors and perceived stress.

Hypothesis $4C_4$: There will be a moderating effect of pharmacist emotional support on the relationship between perceived stress and medication adherence.

Fifth Set of Hypotheses

Hypothesis $5A_1$: There will be main effects between informational stressors and other person appraisal support, nor will there be a main effect between other person appraisal support and perceived stress. There will be a positive main effect between informational stressors and perceived stress.

Hypothesis $5A_2$: There will be negative main effect between emotional stressors and other person emotional support, a positive main effect between emotional stressors and perceived stress, and a negative main effect between other person emotional support and perceived stress.

Hypothesis $5A_3$: There will be negative main effect between instrumental stressors and other person tangible support, a positive main effect between instrumental stressors and perceived stress, and a negative main effect between other person tangible support and perceived stress.

Hypothesis $5A_4$: There will be negative main effect between perceived stress and other person emotional support, a negative main effect between perceived stress and medication adherence, and a positive main effect between other person emotional support and medication adherence.

Hypothesis 5B: The associations between the exogenous variables and (most concerned) other person medication-specific social support variables found earlier using zero order correlations may no longer be significant when using multiple regressions.

Hypothesis $5C_1$: There will be a moderating effect of other person appraisal support on the relationship between informational stressors and perceived stress.

Hypothesis $5C_2$: There will be a moderating effect of other person emotional support on the relationship between emotional stressors and perceived stress.

Hypothesis $5C_3$: There will be a moderating effect of other person tangible support on the relationship between instrumental stressors and perceived stress.

Hypothesis $5C_3$: There will be a moderating effect of other person emotional support on the relationship between perceived stress and medication adherence.

Summary

The literature suggests certain hypothesized relationships between advanced age, higher income, and poor health status (exogenous variables) and medication-related stressors, perceived medication stress, and medication-specific social support (endogenous variables) which can help validate the "nucleus" of the Stress Model of Medication Adherence (SMMA-n). Also, the literature seems to suggest that perceived medication stress will demonstrate either a main (direct) effect, a mediating (or indirect) effect, or both on the relationship between medication-related stressors and medication adherence. And, the literature suggests that the (doctor, pharmacist, and other person) appraisal medication-specific social support will demonstrate a moderating (or buffering) effect on the relationship between subjective informational medication-related stressors and perceived medication stress. Similarly, the literature suggests that the (doctor, pharmacist, and other person) emotional medication-specific social support will demonstrate a moderating (or buffering) effect on the relationship between subjective emotional medication-related stressors and perceived medication stress. Finally, the literature suggests that the (doctor, pharmacist, and other person) tangible medication-specific social support will demonstrate a main (or direct) effect on the relationship between subjective instrumental medication-related stressors and perceived medication stress.

The relationships posited by this “magnified” view of the nucleus of the Stress Model of Medication Adherence (SMMA) have taken into account the relevant literature. The limitations of previous theoretical work have lead to the development of theoretical hypotheses which must be tested to better explain why some elderly outpatients take one or more medications as prescribed while others do not. The next chapter will explain the methodology of the proposed research.

CHAPTER 4
METHODOLOGY

Introduction

This study utilized a cross-sectional retrospective design to explore relationships among four important variables in the proposed Stress Model of Medication Adherence (SMMA). A convenience sample of subjects for this study was taken from a sample frame of subjects over the age of 65 receiving one or more chronic medications from the Ambulatory Care Pharmacy of the Veterans Administration Medical Center in Gainesville, Florida.

This chapter will be divided into four sections. The first section will discuss study instruments. In the second section, the study will be outlined: Study Phase I, and Study Phase II will be discussed in turn. In the third section, human rights will be discussed. This chapter will conclude with a summary.

Study Instruments

As was discussed at the end of Chapter 3, four variables are examined in this study. These variables are: 1) medication adherence, 2) medication-related stressors, 3) perceived medication stress, and 4) medication-specific social support. Measurement of each of these variables will be discussed in turn.

Medication Adherence

Several methods exist for measuring medication adherence. However, all of the measures identified are troublesome (Norell, 1984). An examination of the strengths and weaknesses of these methods will follow, and, given the study's intent, the most appropriate method was chosen and utilized.

There are several methods for measuring medication adherence which fall into two broad categories: direct and indirect. Direct methods of measuring adherence include testing of blood levels and urinary excretion of the medication, a metabolite or marker (Ballinger et al., 1975; Bury and Mashford, 1981; Young et al., 1984; Kapur et al., 1991). While it appears at first glance that these would be fool-proof methods, one must remember that each individual's body will react to medication (even an identical dose) in differing ways. Also, different forms of the same medication will behave differently in each individual. This is especially true of elderly individuals whose pharmacokinetics increasingly change with advanced age (Chapron, 1995). Finally, it is important that the laboratory tests used to determine adherence be carried out accurately and in a timely manner (Sackett and Snow, 1979). Despite the relative disadvantages of this method, it continues to have proponents (e.g., McMurdo et al., 1991).

There are several methods for indirectly determining adherence. The first involves the measurement of outcomes. While it seems reasonable to attribute a successful outcome to adherence with a prescribed regimen, there may be other potentially confounding factors. Among them are support from the family, physician and lifestyle changes (Sackett and Snow, 1979) as suggested by the proposed Stress Model of Medication Adherence (SMMA).

A second indirect measure of adherence is a patient self-report or interview. Self-report may involve the answering of a few yes or no questions about their medication-taking behavior (Morisky et al., 1986; Gil et al., 1993; Brooks et al., 1994). Scientific investigations of patients often overestimate their adherence with treatment regimens. For example, Park and his associates (1994) compared estimates of adherence using the interview and pill count methods among a group of psychiatric outpatients. Their study showed that 100 patients would be considered adherent by using the interview method. However, this dropped to 57 when using the pill count method.

A third method for measuring medication adherence is the pill count method. In this method, the investigator (or patient) simply counts the number of pills remaining in the bottle at some point during treatment. This is compared to the fill date and directions to determine adherence. This method also results in an overestimation of adherence. Problems ensue when family members share medications or medications have more than one purpose (Sackett and Snow, 1979).

Physician assessment of adherence is a fourth method. Studies have shown that physicians are no better at assessing medication adherence than by chance (Caron and Roth, 1968; Sackett and Snow, 1979).

A fifth method is relatively new and involves the use of an electronic medication monitor. One method which has been utilized in numerous medication adherence studies is the Medication Event Monitoring System (Cramer et al., 1995; Wall et al., 1995; and Mason, Matsuyama, and Jue, 1995). Another such monitor has been developed by Seth A. Eisen and his associates (1987). Their device contains two 21-blister medication packets and an unobtrusive electronic chip that records the date and time each pill is removed. It has been shown to yield a highly reliable and valid measure of medication adherence (Eisen et al., 1990) and has been utilized in a clinical study among elderly patients (Carney et al., 1995). Devices have also been developed to record the use of inhalers (Gong et al., 1988; Bosley et al., 1995). There is yet another method involving the use of a portable bar code scanner which provides detailed information about the type of forgetting underlying nonadherence (Leirer, 1988). All of these electronic methodologies suffer from two deficiencies: 1) high cost, and 2) the inability to tell whether the patient really ingests the medication or throws it away once he or she has taken the medication from the dispenser which electronically recorded the medication's removal.

Most investigators have recommended a combination of the above methods (e.g., Gilmore, Temple, and Taggart, 1989). However, the constraints of this study suggest that the most appropriate measure is the self-report. Pill counts would be difficult if not impossible given the methodology (i.e., using a mailed questionnaire). Furthermore, the high costs associated with the use of electronic monitoring devices or laboratory tests precludes the use of these methods. Furthermore, Craig (1985) and Westfall (1986) have suggested that despite its limitations, the self-report may most accurately identify persons who adhere and many of those who do not adhere.

A combination of two self-report measures of medication adherence was used in the study. The first measure was the Medication-taking Behavior scale developed by Morisky, Green and Levine (1986). The second scale was a 24-hour recall scale (Johnson, 1993). Each of these scales will be discussed in turn.

Each subject was asked questions from the Medication-taking Behavior scale. Results of the Morisky, Green and Levine (1986) study have showed the four-item scale to demonstrate both concurrent and predictive validity with regard to blood pressure control at two years and five years, respectively. The specific questions on the Medication-taking Behavior scale are as follows: 1) Do you ever forget to take your medicine? 2) Are you careless at times about taking your medicine? 3) When you feel better do you sometimes stop taking your medicine? and 4) Sometimes if you feel worse when you take the medicine, do you stop taking it? Corrected item-to-total correlations were found to be 0.515, 0.479, 0.527, and 0.561, respectively, for each question. Cronbach's alpha was found in the original study to be low (0.61), but what is considered "low" for alpha depends on the purpose of the research (Churchill, 1979). The questions were scored so that yes=0 and no=1, and the range was 0 to 4. The mean (weighted) for medication adherence in the Morisky, Green and Levine (1986) study (n=290) was found to be 2.31.

Each subject was also asked another simple yes or no question from another self-report scale (Johnson, 1993). The question on this scale is as follows: In the last 24 hours, have you missed a dose of medication?

In using both these instruments together it was important to do an item analysis to determine the final set of items for the revised questionnaire. The decision to retain or delete an item from combined medication adherence scale was loosely based upon the following two criteria: 1) an item-to-total correlation coefficient of 0.3, and 2) a Cronbach alpha of 0.7 (Feketich, 1991). However, as discussed earlier, self-report medication adherence scales are known to suffer from poor reliabilities and it is was likely to get a Cronbach alpha less than 0.7 (Morisky et al., 1986) which would make the results concerning medication adherence only tentative.

Medication-related Stressors

As was discussed in Chapter 3, a new scale had to be constructed to measure medication-related stressors. One of the key issues in this study was to test the validity of this new scale. The procedures used in this study for determining scale validity are concerned with the relationships between performance on the scale and other independently collected facts. These procedures were employed sequentially at different stages of scale construction (Anastasi, 1986). The validation procedures began with a statement of the construct's formulated definition, derived from the review of psychosocial theory and the prior research in Chapter 3.

Medication-related stressors were both subjective and objective. The subjective medication-related stressors were the patient's report of extent of experiences with a broad group of problems, irritants, or annoyances stemming from the medication(s) he or she is currently taking and/or his or her current medical condition(s). These subjective medication-related stressors were initially subcategorized into three types of stressors: 1) informational, 2) emotional, and 3) instrumental. Informational medication-related stressors represented the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a lack of facts about the particular medication(s) he or she is currently taking or his or her current medical condition(s). Emotional medication-related stressors represented the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a felt inability to deal with feelings about his or her current medication(s) or his or her current medical condition(s). Instrumental medication-related stressors represented the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a felt incapacity to acquire his or her current medication(s) or items necessary to take his or her current medication(s) correctly. Finally, there was an objective measure of medication-related stressors which was thought to act in unison with these subjective medication-related stressors to affect perceived medication stress. Specifically, this item was answered by looking at each patient's automated records and is the patient's current number of prescribed medications.

Content-related validation of the new medication-related stressor scale was examined. The items comprising each subscale arose from the literature review in Chapter 3. Content validity for the Medication-related Stressors (MrS) Scale thus began by selection of items from the medical literature and placement into hypothesized informational, emotional, and instrumental subscales. An expert panel reviewed and critiqued the items for content validity, and about fifty subjects were interviewed about readability and understanding of these items. The fifty subjects were also asked if there were any other additional stressors they had experienced. Finally, the fifty subjects were asked if the items appeared to be irrelevant or inappropriate. The end product of these scale development procedures consisted of the items added to and deleted from the initial list generated from the literature review.

Criterion-related validation of the new medication-related stressor scale was also examined. Concurrent validity for subjective medication-related stressors was examined relative to objective medication-related stressors, that is, the total scale score on subjective medication-related stressors was tested for a significant correlation with the objective-medication related stressors. Predictive validity of subjective medication-related stressors was tested by a significant correlation between the subjective medication-related stressors and perceived medication stress.

Construct-related validation of the new medication-related stressor scale was also examined. On a four-point Likert scale, patients were asked to rate the degree to which they experienced subjective medication-related stressors in the past year with 1 = "never," 2 = "once in a while," 3 = "fairly often," and 4 = "very often." A total score for the scale was computed by summing the responses to the 27 items which could range from 27 to 108. As was discussed earlier, these items might be classified as informational, emotional, and instrumental. Since there are nine items in each classification, the scores on these factors ranged from 9 to 36 each.

Construct-related validation of the subjective medication-related stressors scale consisted of factor analyses and internal consistency analyses. Each of these will be discussed in turn.

Construct validity was assessed for the new scale using the principal components model of factor analysis based on the correlation matrix and using varimax orthogonal rotation. It was hypothesized that using a factor analysis would confirm the existence of the three dimensions of the subjective medication-related stressors: 1) informational, 2) emotional, and 3) instrumental.

In using this scale it was important to do an item analysis to determine the final set of items for the revised questionnaire. The decision to retain or delete an item from its respective scale was loosely based upon the following two criteria: 1) an item-to-total correlation coefficient of 0.3, and 2) a Cronbach alpha of 0.7 (Feketich, 1991).

Perceived Medication Stress

Perceived medication stress was defined as representing the patient's evaluations of the medication-related stressors they experienced in the past year. These evaluations were hypothesized to depend on medication-specific social support which will be discussed in the following section.

As was discussed in the literature review in Chapter 3, the 14-item Perceived Stress Scale (PSS) developed by Cohen, Karmack and Mermelstein (1983) is the "gold standard" in the field of perceived stress research. However, this scale is not as "adaptable" to medication-taking as another scale that was identified in the literature. This new scale was developed to measure psychosocial adjustment specific to diabetes and is called the Problem Areas in Diabetes Survey (PAID: Polonsky et al., 1995).

On a six-point Likert scale, patients rate the degree to which each item is currently problematic for them, from 1 ("no problem") to 6 ("serious problem"). A total score for the scale is computed by summing the responses to the 20 items which can range from 20 to 120.

However, there were two problems when adapting the PAID survey for use in this study. First, no attempt was made to address the multidimensional nature of this scale in the original study. A cursory examination of the 20 items comprising the scale suggested that some items deal with feelings about one's medication regimen, while other items deal with feelings about one's medical condition or social support. It was hypothesized that medication-related stressors would be more strongly associated with the feelings about one's medication regimen, as opposed to the other items. Second, there are the numerous references to diabetes in the PAID survey. For this study, these items were re-worded to reflect perceived stress from medication-taking in general, rather than from just medications taken for diabetes. This required, for example, deletion of the word "diabetes" from the item, or substitution of the words "your condition" for "diabetes."

Criterion-related validation of the revised scale consisted of concurrent and predictive validation. Concurrent validity for the revised scale was studied by examining the distribution of the revised item scores to the established PAID item scores, indicating the percentage of subjects who reported each item as a "serious problem" (scoring 5) and as "no problem" (scoring 2). Also, the total scale score on the revised scale was tested for a significant correlation with the total score of the established survey. Predictive validity of the revised instrument was also examined. Again, medication-related stressors should have been strongly correlated with this scale, because level of stressors should predict level of perceived stress. Also, predictive validity was tested with a correlation between the score on the revised perceived stress scale and the combined medication adherence scale.

Construct validity was assessed for the scale, using the principal components model of factor analysis based on the correlation matrix and using Varimax (Orthogonal) Rotation and Kaiser Normalization. It was hypothesized that using a factor analysis would confirm the existence of the three dimensions of the perceived medication stress: 1) medication-related, 2) disease-related, and 3) support related. For the purposes of testing the proposed model, only the medication-related dimension was used.

In using this scale it was important to do an item analysis to determine the final set of medication-related items for the revised questionnaire. The decision to retain or delete an item from its respective scale was loosely based upon the following two criteria: 1) an item-to-total correlation coefficient of 0.3, and 2) a Cronbach alpha of 0.7 (Feketich, 1991).

Medication-specific Social Support

Medication-specific social support was defined as representing the patient's perception of a broad group of services or activities he or she might receive from a doctor, a pharmacist, and a (most concerned) other person, which might help the patient deal effectively with medication-related stressors. Without this medication-specific social support, the patient may evaluate the medication-related stressors he or she is experiencing as overwhelming, threatening, or harmful, and he or she may stop taking his or her medication(s). Medication-specific social support services or activities were initially subcategorized into three types of support: 1) appraisal, 2) emotional, and 3) tangible. Appraisal medication-specific social support represented the patient's evaluation of a subgroup of services or activities he or she might have received from a doctor, pharmacist, or (most concerned) other person which might have helped the patient understand his or her medication(s) and/or medical condition(s). Emotional medication-specific social support represented the patient's evaluation of a subgroup of services or activities he or she might have received from a doctor, pharmacist, or (most concerned) other person, which might have helped the patient deal effectively with emotional problems related to his or her medication(s) and/or medical condition(s). Tangible medication-specific social support represented the patient's evaluation of a subgroup of services or activities he or she might have received from a doctor, pharmacist, or (most concerned) other person, which might have helped the patient obtain or procure their medication(s) and/or items that assisted them in the administration of their medication(s).

The only instrument which was identified in the literature specific to medication-taking is a social support scale developed by Caplan et al. (1980). There are specific items related to "doctor support" and specific items related to "(most concerned) other person support." For the purposes of this study, items representing doctor support were duplicated for use in another subscale for "pharmacist support."

Although these scales were originally developed to indicate structural support from a doctor or (most concerned) other person, three particular items in these scales seem to indicate functional support. One of the items in the doctor subscale seemed to indicate appraisal medication-specific social support, that is, "[this person] helped me fully understand when and how to follow my treatment." Also, one of the items in the (most concerned) other person subscale seemed to indicate emotional medication-specific social support, that is, "[this person] offers help and shows real concern about my health." Finally, one of the items in the (most concerned) other person subscale seemed to indicate tangible medication-specific social support, that is, "[this person] helps me remember things such as taking my medicine, refilling prescriptions, and keeping doctor's appointments."

Other Conditioning Variables

In addition to the four constructs above, descriptive statistics were gathered on ethnicity, income, age, gender, and health status. Each will be discussed in turn.

Each subject was asked about his or her ethnic origin. This question was answered by choosing one of the following: 1) White [not of Hispanic origin], 2) Black [not of Hispanic origin], 3) Hispanic, 4) Asian or Pacific Islander, and 5) American Indian or Native Alaskan.

Each subject was asked what was roughly his or her gross annual income in dollars. Subjects were asked to check one box which corresponded most closely to their annual income, marked as follows: 1) less than $5,000, 2) $5,000 to 9,999, 3) $10,000 to 14,999, 4) $15,000 to 19,999, 5) $20,000 to 24,999, 6) $25,000 to 29,999, 7) 30,000 to 34,999 8) 35,000 to 39,999, and 9) greater than $40,000.

The patient's age and gender was obtained from the pharmacy's automated records. The age was recorded in years (a whole number) up to the subject's last birthday. The scoring on the gender item was such that male=0 and female=1.

Health status was recorded using two different methods. First, health status was measured using a self-rated health scale (Ware et al., 1980). The scale reads as follows: "In general, would you say your health is (circle one number): 5) Excellent, 4) Very Good, 3) Good, 2) Fair, or 1) Poor? Second, health status was determined using the Chronic Disease Score (CDS: Von Korff et al., 1992). The CDS algorithm utilizes data from computerized medication profiles. For example, a patient with an anticoagulant (=3), an oral hypoglycemic (=2), and a theophylline product (=2) would have a CDS score of 7.

Study Phase I

Study Phase I consisted of three parts. In part one, a questionnaire was administered to a convenience sample of 50 subjects in the pharmacy lobby. After reading the questionnaire the subjects were queried about the readability and understanding of the items. Furthermore, they were asked whether any of the items should not be included in the scale and if any other items should be included that they have experienced. In part two, the responses from the questionnaire were subjected to an item-analysis. In part three, one hundred questionnaires were mailed to subjects to test for the response rate. Given the data collected in Study Phase I, a more accurate estimation of response rate and correlations among the major variables was used in the computation of sample size.

Study Phase I, Part One

In this study phase, a scale was developed to measure a construct proposed in the "nucleus"of the Stress Model of Medication Adherence (SMMA-n): Subjective medication-related stressors. Items were generated from the literature review in Chapter 3 to include in each of the three proposed subscales and modeled after another more general instrument in the literature which has been discussed in Chapter 3. Expert judges provided additional review of these three subscales for their content validity, readability, and face validity.

A questionnaire containing the new medication-related stressors scale and all the other instruments discussed in the above sections were administered to a convenience sample of 50 subjects who visited the lobby of the Ambulatory Care Pharmacy at the Veterans Administration Medical Center in Gainesville, FL, while having their prescriptions filled. The inclusion criteria required that subjects be over the age of 65 and currently receiving one or more chronic medications in the mail from the mail-out section of a Veterans' Administration Medical Center Ambulatory Care Pharmacy.

To find out whether subjects adequately understood the questions, the sample of respondents who participated in the pretest were asked about the interpretation and clarity of the questions and directions after their completion of the questionnaire. For each question, patients were asked to restate the question in their own words and to give examples of what the question meant to them. It was hoped that the meaning associated to these questions by all the subjects would be congruent with the intended meaning of each question, indicating clarity of the items. Also, subjects were asked about the ease of recalling the experiences.

Study Phase I, Part Two

After the responses for the medication-related stressor scale were entered into the computer, the items were grouped into subscales according to what they were intended to measure (i.e., informational, emotional, or instrumental.) The internal consistency of each subscale was calculated to obtain reliability estimates. Reliability of each subscale was assessed through the use of Cronbach's coefficient alpha statistic. The coefficient alpha provided an estimate of how consistently subjects performed across items measuring the same construct definition. A high value of coefficient alpha would indicate a consistent performance of respondents across items. It would also indicate that the performance is generalizable to other potential items pertaining to the same content domain (Crocker and Algina, 1986). Although what is considered "low" for alpha depends on the purpose of the research (Churchill, 1979), a reliability estimate of 0.70 is considered acceptable (Nunnally, 1978).

An item analysis was also examined to determine the final set of items for the revised questionnaire. The decision to retain or delete an item from its respective subscale was loosely based upon the following two criteria: 1) an item-to-total correlation coefficient of 0.3, and 2) a Cronbach alpha of 0.7 (Feketich, 1991).

Corrected item-to-total correlations involved the correlations of item score with the total score of the remaining items in the scale under examination. Corrected item-to-total correlations were calculated to adjust for spurious values that might have been obtained when the item scores contributed to the total scores (Crocker and Algina, 1986). Corrected item-to-total correlations were especially relevant when there is a small number of items in the scale (Ferketich, 1991). A more recent "rule of thumb" for corrected correlations is that they should be 0.50 or greater (Bearden et al., 1989). However, corrected correlations above 0.30 have been considered sufficient (Nunnally, 1978).

The revised coefficient alpha revealed the changes in alpha if the item was dropped from the scale. If there was a substantial improvement in alpha when the item was deleted, this was considered as some support for dropping the item. However, the revised alpha was most informative when it was used in combination with the aforementioned aspects of item analysis.

Individual scale items were evaluated in terms of their inter-item correlations, item-to-total correlations, and revised coefficient alphas when an item was deleted from the scale. The decision to delete or retain an item was determined on both psychometric and conceptual grounds. Caution was taken not to eliminate items only on its psychometric characteristics because of the relatively small Study Phase I sample size.

Certain changes were made in the scales before it was mailed to the larger sample in Study Phase II. These changes were outlined in the results section. Given that the subjects were elderly outpatients, the response burden was kept as low as possible to improve response rate.

Study Phase I, Part Three

According to a statistical report generated at the Veterans Administration Medical Center-Gainesville, there were 5,871 elderly patients (aged 65 and over) getting one or more medications from the Ambulatory Care Pharmacy. This represented the sample frame of subjects for this study.

The most important considerations in the study for sample size considerations involved the needs for the multiple regressions and the factor analyses. Each of these considerations will be discussed in turn.

The most accurate correlations found in the literature review were the following: a correlation of 0.48 between stressors and perceived stress (Frenzel, 1988) and a correlation of -0.12 between perceived stress and medication nonadherence (Coons et al., 1994). Because the scales that were developed in this study were more specific (and hence higher correlations were anticipated), both of these correlations represented conservative estimations. However, it was anticipated that the medication-specific social support items would have much lower correlations (e.g., $r < .10$). By using the STAT-POWER program (Baroy, 1993), a sample size of 700 cases was required, for the latter (smaller) correlation. In a study which mailed a 63-item questionnaire to 800 senior citizens in a rural area of Idaho, there was a 65% response rate (Johnson, 1972). Although the present study's questionnaire is not about recreational pursuits, the fact that this survey was sent to senior citizens in a rural area and the questionnaire was about the same length appeared to suggest a 65% response rate for this study. With this response rate, 1100 cases would be required.

For factor analysis, the smallest subject-to-item ratio is often considered in the 5 to 10 subject-to-item range (Crocker and Algina, 1986). Since the new scale contained 27 items, a 5-to-1 ratio required 135 subjects, and a 10-to-1 ratio required 270 subjects. To be conservative an anticipated 65% response rate, required the mailing of approximately 446 questionnaires. Since the 446 questionnaires required is less than the 1100 questionnaires required from the previous calculation, it was anticipated that 1100 questionnaires would have to be mailed.

In part three, one hundred more questionnaires were mailed to subjects at home to test the response rate (see Appendix A). These questionnaires were mailed just as they were in Study Phase

II. Given all the data collected in Study Phase I, a more accurate estimation of response rate and correlations among the major variables was thought to aid in a better computation of sample size.

Study Phase II

The objectives of this study phase were to validate the new subjective medication-related stressors scale and test the relationships among the four scales in the "nucleus" of the proposed Stress Model of Medication Adherence. In Study Phase II, the revised questionnaire was mailed to a convenience sample of approximately 1,100 veterans (depending on the results of the initial mailout) 65 years of age and older receiving one or more medications through the mail from the same Veterans Administration Medical Center Ambulatory Care Pharmacy.

This section will continue with a discussion on the data collection procedures. It will end with a discussion of the statistical analyses to be done with the data when the revised mail questionnaires are returned, which involved the following: 1) descriptive statistics, 2) zero-order correlations, 3) factor analyses, 4) reliability analyses, and 5) multiple regressions.

Study Phase II, Part One

A convenience sample of approximately 1,100 patients were chosen from requests for prescriptions to be mailed to them from the Ambulatory Care Pharmacy at the Veterans Administration Medical Center in Gainesville. Each subject chosen had to be over 65 years of age and taking one or more prescribed medications on a regular basis.

Data collection required two important steps: 1) an initial questionnaire mailout, and 2) a postcard follow-up. It was hoped that by discontinuation of this data collection process, 700 completed, usable questionnaires would be analyzed for a response rate of 65%. If not, a return to the mail requests for more names and more mailings of the questionnaire would have been initiated until the necessary 700 usable questionnaire demand was met.

Cover letter

The cover letter emphasized the usefulness of the study, explained the importance of the respondent's response, and assured that confidentiality would be upheld. The signature of the chief of pharmacy was at the bottom. If subjects had questions regarding the questionnaire they were asked to call the VAMC-Gainesville ambulatory care pharmacy.

Identification system

An identification system was used to facilitate the sending of follow-up mailings. Therefore, confidentiality but not anonymity was offered. Questionnaires were identified by a patient ID number written on the upper right-hand corner of the questionnaire, a position in which it was easily visible. The number corresponded to one written next to the respondent's name on the mailing list.

Precoding procedure

The questionnaires were precoded based upon pretest responses to the extent feasible. Responses from each questionnaire were transferred to a SPSS 7.5 for Windows (SPSS Inc., 1997) computer file. Each response category was assigned an identifying number which was used to represent that response on the SPSS 7.5 for Windows (SPSS Inc., 1997) computer file. The columns to which a response was transferred were listed beside each question on the questionnaire. The result of this precoding effort was the ability to go quickly from the questionnaire to the SPSS 7.5 for Windows (SPSS Inc., 1997) computer file for analysis.

Mail-out

This questionnaire mail-out occurred in April, 1997. As outlined above, a convenience sample of about 1100 subjects was surveyed. Surveys were mailed to the patients' homes. A copy of the revised questionnaire is contained in the Appendix B.

Postcard follow-up

According to Dillman et al. (1974), most people who answer questionnaires do so almost immediately after they receive them. A questionnaire that lies unanswered for a week or more is not likely to be returned. In repeated studies, Dillman et al. (1974) observed that half the return envelopes were postmarked within two or three days after being received by respondents. After that time, the number of postmarked returns declined, sharply at first and then gradually, but nonetheless consistently.

One week after the initial mail-out date, a postcard follow-up was mailed to the entire sample of subjects. The postcard urged nonrespondents to complete and return the questionnaire. It also served to thank those who had already returned the questionnaire. This mailing seemed to produce more returned questionnaires (some usable and some not usable) within the span of four weeks, after which data collection was discontinued.

Study Phase II, Part Two

The two major goals of the study were to: 1) validate the new subjective medication-related stressors scale, and 2) to test the proposed Stress Model of Medication Adherence. In this phase, validation of the new scale involved both criterion-related validation and construct-related validation. Criterion-related validation required both concurrent and predictive validation. This required accumulation of information from two specific techniques: 1) descriptive statistics and 2) correlational analysis. Construct-related validation required the accumulation of information from two other techniques: 1) factor analysis and 2) Cronbach's Alpha internal reliability. Testing of the proposed Stress Model of Medication Adherence involved the use of multiple regressions. All analyses were done using SPSS 7.5 for Windows (SPSS, Inc., 1997).

Descriptive statistics

In this initial phase of the analysis, means, standard deviations, ranges (with minimums and maximums), and 95% confidence intervals of all measures were calculated. For those measures that are not new, their descriptive statistics were compared to those obtained in previous studies.

The means and standard deviations of the objective (number of prescriptions) and subjective (informational, emotional, and instrumental) medication-related stressors, (appraisal, emotional, and tangible) medication-specific social support, perceived medication stress, medication adherence, age, gender, income, ethnicity, self-rated health, and Chronic Disease Score were calculated. Given these statistics and correlations between these variables, preliminary conclusions were made about both the concurrent and predictive validity of the new medication-related stressors measure.

Another preliminary step in the analysis involved an examination of the descriptive statistics of the various measurements and a decision of the type (parametric versus nonparametric) of the subsequent analyses. Most of the independent variables and the dependent variable were measured by summing items scores, that is, by adding items together to form a subscale using the mean of that subscale to represent the score on that variable. When the range of possible scores on an ordinal scale is increased, data begins to take on the appearance of being continuous. Therefore, the ordinal data was tested to see if it was normally distributed.

For each subscale mean and each independent item, the following hypothesis were tested: 1) the values are a random sample from a normal distribution, and 2) the data will test against a normal distribution with mean and variance equal to the sample mean and variance. The Kolomogoriv D statistic was computed. It was anticipated that the data would not fail this test of normality.

Although the data might not have passed the tests of normality, the distribution means may have approximated a normal distribution due to a large number of responses ($n \approx 700$). This is because of the Central Limit Theorem. According to this theorem, even if the distribution of x was not normal, the distribution would become closer and closer to the normal distribution with mean and variance^2 as x got larger (Armitage, 1973).

Parametric analyses were utilized for tests affected by the Central Limit Theorem. The researcher may have had to trade the advantages of nonparametric analysis, that is, 1) their freedom from assumptions about the distribution of the scores in the population and 2) their simplicity, for the advantages of parametric analyses. Parametric analyses are more powerful and provide more information from the data when the assumptions of the particular analysis are met (Keppel, 1991). For analyses not affected by the Central Limit Theorem, nonparametric tests would have be chosen.

Zero-order correlations

Zero-order correlations between exogenous variables and endogenous variables were used to help establish validity for the nucleus of the proposed Stress Model of Medication Adherence. Also zero-order correlations between independent variables and between the independent variables and the dependent variable(s) were examined. For the testing of hypotheses with the magnitude and directionality of the relationship between two variables, intercorrelational analyses and the correlation coefficient were used.

A correlation matrix showing the strength of association between all combinations of independent and dependent variables addressed questions like these. However, as mentioned before, a major goal of the proposed study was to validate the new subjective medication-related stressors scale. Therefore, the subscale scores of the new subjective medication-related stressors scale was tested for significant correlations with the objective medication-related stressors measure (number of medications). Furthermore, predictive validity of the subjective medication-related stressors subscales was tested by significant correlations between the subscale scores on the medication-related stressors scale and the score on the perceived medication stress scale.

Factor analyses

A factor analysis was conducted for each construct. First, a factor analysis was used to evaluate the unidimensional nature of the medication adherence scale. Second, a factor analysis was used to evaluate the multidimensional nature of the medication-related stressor scales (e.g., for informational, emotional, and instrumental factors). Third, a factor analysis was used to evaluate the unidimensional nature of the perceived medication stress scale. Finally, three factor analyses were used to evaluate the multidimensional nature the doctor, pharmacist and (most concerned) other person medication-specific social support scales (e.g., for appraisal, emotional, and tangible support factors).

Using a principal components analysis with Varimax Rotation and Kaiser Normalization, the number of items were reduced from the number of original items to a relatively small number of factors, or common traits. A factor analysis could discover patterns among the variations in values of several variables. This is done essentially through the generation of artificial dimensions (factors) that correlate highly with several of the real variables and that are independent of one another (Harman, 1976; Gorsuch, 1983).

Factor analysis does have its disadvantages, and the results were kept in perspective. Factors are generated without any regard to substantive meaning. Often researchers will find factors producing very high loadings for a group of substantively disparate variables. Factor analysis is like other complex modes of analysis. It should be encouraged whenever such activity may assist in understanding a body of data. As in all cases, the investigator must remain aware that such tools are only tools and never "magical" solutions (Crocker and Algina, 1986).

Cronbach's coefficient alpha reliability

As in Study Phase I, Cronbach's coefficient alpha statistic was calculated. However, unlike in Study Phase I, Cronbach's alpha was calculated for each factor identified for the four scales. Items with item-to-total correlations less than 0.50 may have been dropped. An index was constructed for each of the factors by summing the unweighted responses to each item included in the factor.

Multiple regressions

The predictive validation of the scales used in the study partly would lie in four effects. These were as follows: 1) the mediating (indirect) effect of the perceived medication-stress on the relationship between each type of medication stressor and medication adherence, 2) the main (direct) effect of tangible medication-specific social support on the relationship between instrumental medication-related stressors and perceived medication stress, 3.) the moderating (buffering) effect of appraisal medication-specific social support on the relationship between informational medication-related stressors and perceived medication stress, and 4.) the moderating (buffering) effect of emotional medication-specific social support on the relationship between emotional medication-related stressors and perceived medication stress. The mediating and moderating effects were examined using procedures suggested by Baron and Kenny (1986).

To test the mediating effect of perceived medication stress, a series of multiple regression analyses were conducted. According to Baron and Kenny (1986), the mediating model can be substantiated by three regression equations. First, the medication adherence (outcome variable) was regressed on the medication stressors (predictor variable). In the second equation, perceived medication stress (mediator variable) was regressed on medication stressors (predictor variable). The third equation involved regressing medication adherence (outcome variable) simultaneously on medication stressors (predictor variable) and perceived medication stress (mediator variable).

In order to test medication-specific social support as a moderator (buffer) of medication-related stressors, another entry procedure suggested by Baron and Kenny (1986) was utilized. First, medication-related stressors (MrS) and medication-specific social support (MsSS) were entered in step one. The interaction term of medication-related stressors and medication-specific social support (MrS X MsSS) was entered on step two. Steps one and two were repeated for each subscale of medication-related stressors and medication-specific social support.

In these types of regression analyses, it has been suggested that deviation scores on the variable(s) from their means be considered (Finney et al., 1984). The estimated effects of the constituent variables are still those at the zero point of the variables(s), but, after deviation, the zero point is the mean of the variable(s) (Southwood, 1978). Such average effects have been estimated in several studies of stress and coping or social support (e.g., Williams et al., 1981).

It has been suggested that deviation scores in these types of multiple regressions are a cure for the multicollinearity problem (high correlation between the product-term and one or more of its constituents) that often arises with the use of untransformed (raw) scores (Cronbach and Snow, 1977). Although deviation scores will reduce the product-term's correlation with the constituent variables, multicollinearity poses no threat to the analysis of interactions or main effects, unless the correlation is so high as to produce rounding errors in computer calculations (Southwood, 1978).

Since the standard regression coefficient denotes the linear effects of an independent variable, the actual magnitude of the coefficients will be tested by hierarchical multiple regression. For testing the goodness of fit of a linear model, R^2 was used for coefficient determination. The most important set of hypotheses in the study treated the magnitude and model of the effects of medication-specific social support as competing models, that is, main versus moderating models. The interaction term, a linear X linear interaction, would enhance the prediction of the dependent variables beyond the first order term and would suggest a moderator effect of a type of doctor, pharmacist, or (most concerned) other person medication-specific social support.

Although such transformations are useful, they affect the interpret ability of the regression coefficients; therefore, some investigators prefer to interpret standardized regression coefficients in the context of certain multiple regression applications (Jaccard, Turrisi and Wan, 1990). Therefore, both types of multiple regressions (with raw scores and deviation scores) were done.

Human Rights

The research protocol was reviewed by the Committee on Protection of Human Subjects of the University of Florida and the research service of the VAMC-Gainesville. Participants in Study Phase I were solicited voluntarily in person. Participants in Study Phase II were solicited with a recruitment letter and informed that their responses would be kept confidential.

Summary

To adapt a general stress model to explain elderly patients' medication-taking, elderly outpatients were surveyed using an interview and mail survey methodology in two separate study phases. Study Phase I involved the development and initial validation of a medication-related stressors scale. Study Phase II involved further validation of medication-related stressors scale and an exploratory investigation of the proposed Stress Model of Medication Adherence using responses obtained from about 700 elderly outpatients in a mail survey. The dependent variable was medication adherence. The independent variables were medication-related stressors,, medication-specific social support income, ethnicity, age, gender, and health status. Perceived medication stress was either a dependent or independent variables depending on the context in which it was used. This exploratory investigation of the proposed Stress Model of Medication Adherence focused on the important main, mediator and moderator effects.

The next chapter will begin with a detailed presentation of the results of the analyses. And, then the chapter will end with a discussion and interpretation of these results.

CHAPTER 5
RESULTS

Introduction

The study was conducted in two phases. In Phase I, a questionnaire was administered to a convenience sample of fifty subjects in the lobby of an outpatient pharmacy to test the readability and understanding of the items. Then, the same questionnaire was mailed to a convenience sample of one hundred elderly outpatients to test for the response rate. The data from both samples were then combined and analyzed and a revised questionnaire was generated. In Phase II, the revised questionnaire was mailed to a convenience sample of 1,600 elderly outpatients. The data from this sample was then analyzed, and reported here.

Study Phase I

Study Phase I consisted of two parts. In the first part of Phase I, fifty subjects filled out questionnaires in the lobby of the outpatient pharmacy. In the second part of Phase I, one hundred questionnaires were mailed to a convenience sample of one hundred subjects. Forty-four of the one hundred subjects responded to this initial mailing. In the second part of Phase I, the data from the fifty subjects in the lobby of the outpatient pharmacy was compared to the data from the subjects who responded to the mailed questionnaire. After a comparison of the mean responses on several of the key items, the two data sets from Phase I were combined. The frequencies of responses to all categorical variables, the means and standard deviations of the summated scales, and the demographic data on the sample of subjects in the pilot study are reported A correlation matrix of the independent variables was examined to determine whether conceptually distinct scales had low correlations.

Item analyses for each of the four scales will be reported. Item-to-total correlations will be examined, and Cronbach's coefficient alpha was recalculated each time it was decided to delete an item.

Comparison between Phase I Lobby and Mail Samples

Before the results from the two samples could be pooled, an examination was made of the two samples on four groups of items: 1.) medication adherence, 2.) subjective medication-related stressors, 3.) perceived medication stress, and 4.) medication-specific social support. There were no statistically significant differences (Table 5.1)

Phase I Sample Description and Measures

About seventy percent of the respondents in Phase I were "young-old" elderly, whereas only twenty-seven percent of the respondents were "middle-old" elderly. Almost all the respondents were male and of white (Caucasian) ethnicity. About seventy percent of the respondents had an annual income of less than $20,000. About fifty-nine percent of the respondents rated their own health as fair or poor; whereas, about fifty percent had a Chronic Disease Score between 6 and 15.

Medication adherence

The medication adherence items had a Cronbach's alpha of 0.5021 calculated using the four items from the Morisky, Green, and Levine scale (1986). However, it seems prudent to attempt to

Table 5.1 Phase I Comparison between Lobby and Mail Samples on Four Groups of Questionnaire Items

Group of Items	Mean	S.D.	t (Sig.)
Medication Adherence (4 items)			-.228(.912)
Lobby	3.2500	.9785	
Mail	3.2955	.9296	
Subjective Medication-related Stressors (27 items)			-.426(.452)
Lobby	39.4318	10.1119	
Mail	40.4524	9.2161	
Perceived Medication Stress (20 items)			.198(.507)
Lobby	45.6000	24.1345	
Mail	44.6364	21.7385	
Medication-specific Social Support (15 items)			.988(.561)
Lobby	63.3023	9.8381	
Mail	61.1579	9.6493	

Table 5.2 Phase I Sample Description

Characteristic	n*	Category	Frequency	Percent
Age	94	65 to 74 ("young-old") 75 to 84 ("middle-old") 85 to 100 ("old-old")	66 27 1	70.3 28.6 1.1
Gender	94	Male Female	92 2	97.9 2.1
Ethnicity	92	White (not of Hispanic origin) Black (not of Hispanic origin) Hispanic American Indian or Native Alaskan Asian or Pacific Islander	85 5 2 0 0	92.4 5.4 2.2 0.0 0.0
Income	84	Less than $5,000 $5,000 to $9,999 $10,000 to $14,999 $15,000 to $19,999 $20,000 to $24,999 $25,000 to $29,999 $30,000 to $34,999 $35,000 to $39,999 Greater than $40,000	5 25 16 13 11 4 5 2 3	6.0 29.8 19.0 15.5 13.1 4.8 6.0 2.4 3.6
Self-rated Health	93	Poor Fair Good Very Good Excellent	23 32 26 10 2	24.7 34.4 28.0 10.8 2.2
Chronic Disease Score	94	0 to 2 3 to 5 6 to 8 9 to 11 12 to 15	24 23 31 13 3	25.6 24.5 32.9 13.8 3.2

* The maximum number of responses that could have been collected on each of these characteristics was 94. However, some subjects did not wish to respond to some of these questions. For example, ten subjects (10.6% of the Phase I sample) did not wish to reveal their income, dropping n for the income characteristic from 94 to 84.

improve the psychometric properties of this group of items by including the 24-hour recall item used in similar research studies on assessing medication compliance (e.g., Johnson, 1993). When the 24-hour recall item was included, the Cronbach's alpha improved to 0.6089. Furthermore, when one of the original Morisky, Green, and Levine scale items concerning adherence when feeling worse was dropped because of a poor item-to-total correlation of 0.1280, the Cronbach's alpha improved to 0.6526 (Table 5.3).

Subjective medication-related stressors

Two of the emotional subjective medication-related stressor items had low item-to-total correlations, that is, "felt that no one would agree with you when you thought taking your medication was unnecessary" (.2504) and "felt that no one understood why you felt embarrassed about taking your medications in front of other people" (.2823). When these two items were dropped the Cronbach's alpha improved from 0.7757, to 0.7831 (Table 5.4). There was some apprehension about these items and their low correlation with number of prescriptions. Therefore, five more items were generated for the revised questionnaire: 1) "felt that taking your medications as directed by your doctor was easy," 2) "felt that you were taking too many medications,"3) "felt uncomfortable interrupting the pharmacist to ask a question,"4) "felt that if you had a medication problem you could deal with it the right way, and 5) "felt like you had a problem with your medication."

There were fewer concerns about the informational and instrumental medication-related stressor items. Only one item concerning nonprescription medications was dropped from the informational subscale, and only one item concerning the timeliness of refills was dropped from the instrumental subscale because of low item-to-total correlations. After these changes, the Cronbach's alpha for the informational subjective medication-related stressors improved to 0.7134 (Table 5.5). The

Table 5.3 Phase I Medication Adherence Items: Reliability Coefficients and Item-to-total Correlations (n=91)

	Item-to-total Correlations*	
Medication-taking Behavior Scale		
1. Are you careless at times about taking your medication?	.4981	
2. When you feel better do you sometimes stop taking your medicine?	.3786	
3. Do you forget to take your medicine?	.2562	
4. Sometimes if you feel worse when you take the medicine, do you stop taking it?	.1142	
Medication-taking Behavior Scale and '24-Hour Recall' Item		
1. Are you careless at times about taking your medication?	.5529	.5828
2. In the last 24 hours, have you missed a dose of medication?	.4638	.4692
3. When you feel better do you sometimes stop taking your medicine?	.4328	.3783
4. Do you forget to take your medicine?	.3033	.3548
5. Sometimes if you feel worse when you take the medicine, do you stop taking it?	.1280	

*For the first group of items, all items are included in the first and only column and Cronbach's alpha was 0.5021. For the second groups of items, all items are included in the first column and the Cronbach's alpha was 0.6089. In the second column, item 5 was deleted and Cronbach's alpha improved to 0.6526.

Table 5.4 Phase I Emotional Subjective Medication-related Stressor Items: Reliability Coefficients and Item-to-total Correlations (n=91)

	Item-to-total Correlations*		
1. Felt that no one listened to you about your medication problems	.6602	.6498	.6447
2. Felt that no one seemed really interested in your medication taking	.5694	.5856	.6152
3. Felt that no one could help you deal with your medication problems	.6043	.6243	.6149
4. Felt that no one could help you feel more confident about taking your medications as directed	.5470	.5277	.4986
5. Felt that no one could explain something to you about your medication	.4284	.4326	.4366
6. Felt that no one treated you normally because of the medication you take	.4034	.4096	.4288
7. Felt that no one understood why a side effect of your medication was upsetting you	.3886	.3780	.3624
8. Felt that no one understood why you felt embarrassed about taking your medications in front of other people	.2823	.2702	
9. Felt that no one would agree with you when you thought taking your medication was unnecessary	.2504		

*In the first column, all items are included and Cronbach's alpha was 0.7757. In the second column, item 9 was deleted and Cronbach's alpha improved to 0.7788. In the third column, item 8 was deleted and Cronbach's alpha improved to 0.7831.

Table 5.5 Phase I Informational Subjective Medication-related Stressor Items: Reliability Coefficients and Item-to-total Correlations (n=89)

	Item-to-total Correlations*	
1. Not known what to do if you missed a dose of medication	.5116	.5053
2. Not known if you should change the dose of your medication when you did not feel right	.4346	.4684
3. Not known if something that happened to you was a side effect of your medication	.4624	.4261
4. Not known whether a medication given to you by one doctor should be taken with a medication given to you by a different doctor	.4602	.4142
5. Not known if you should drink alcohol and/or smoke while taking your medication	.3418	.3849
6. Not known if your medication was working right	.3921	.3819
7. Not known if you were taking your medication correctly	.3390	.3792
8. Not known what to do if a side effect of your medication occurs	.3422	.3473
9. Not known if you should use a nonprescription medication	.2496	

*In the first column, all items are included and Cronbach's alpha was 0.7094. In the second column, item 9 was deleted and Cronbach's alpha improved to 0.7134.

Table 5.6 Phase I Instrumental Subjective Medication-related Stressor Items: Reliability Coefficients and Item-to-total Correlations (n=93)

	Item-to-total Correlations*	
1. Had trouble getting something to keep track of how well your medication is working	.6133	.6049
2. Had trouble getting easy to read information about the medications you take	.5861	.5926
3. Had difficulty getting an easy to open medication container	.5738	.5825
4. Had trouble finding something to remind you to take your medications on time	.5482	.5595
5. Had difficulty getting an up-to-date list of your medications	.4728	.5153
6. Had difficulty getting an easy to swallow medication	.4501	.4552
7. Had trouble getting something to remind you to have your medications refilled on time	.4053	.3997
8. Had difficulty getting transportation to a doctor's office or pharmacy	.4138	.3820
9. Had problems getting your medication refilled before your current supply ran out	.2927	

*In the first column, all items are included and Cronbach's alpha was 0.7871. In the second column, item 9 was deleted and Cronbach's alpha improved to 0.7972.

Cronbach's alpha for the instrumental subjective medication-related stressors improved to 0.7972 (Table 5.6).

The ninety-four Phase I subjects were taking a mean number of 8.31 (s.d.= 4 63) prescriptions. The number of prescriptions was the objective medication-related stressor measure that should be positively associated with subjective medication-related stressors to establish concurrent validity, that is, as the number of prescriptions increases, the amount of experienced subjective stressors should increase. This association was demonstrated when the informational (r=.284, p <.01) and instrumental (r=.298, p <.01) subscales.. However, there was no association between the emotional items and number of prescriptions.

Perceived medication stress

The four items that reflect the construct all had good item-to-total correlations. Cronbach's alpha for the four items was 0.8520 (Table 5.7).

Medication-specific social support

There were only enough items from the adapted scale to perform reliability analyses for doctor emotional medication-specific social support (Table 5.8) and pharmacist emotional medication-specific social support (Table 5.9). Both these analyses demonstrated good item-to-total correlations and a good Cronbach's alpha. However, more items needed to be generated and the existing items needed to be made more specific to medication taking.

It was decided that the doctor medication-specific social support items would read the same as the pharmacist items after all the modifications were made. One of the doctor emotional medication-specific social support items asking the subject if the doctor or pharmacist had "acted in a warm and friendly manner" did not seem to adequately reflect emotional medication-specific social support and was dropped. The appraisal medication-specific social support item asking the

Table 5.7 Phase I Perceived Medication Stress Items. Reliability Coefficients and Item-to-total Correlations (n=91)

	Item-to-total Correlations*
1. Feeling overwhelmed by your medication regimen	.8018
2. Feeling discouraged with your medication regimen	.7271
3. Worrying about reactions (between two or more medications)	.6405
4. Feeling guilty or anxious when you get off track with your medication	.6088

*Cronbach's alpha = 0.8520

Table 5.8 Phase I Doctor Emotional Medication-specific Social Support Items: Reliability Coefficients and Item-to-total Correlations (n=92)

	Item-to-total Correlations*
1. Helped me work through any worries or concerns related to my condition	.7460
2. Made me feel confident I can take medicines and can do what else was asked	.6987
3. Acted in a warm and friendly manner	.6498

*Cronbach's alpha = .8344

Table 5.9 Phase I Pharmacist Emotional Medication-specific Social Support Items: Reliability Coefficients and Item-to-total Correlations (n=92)

	Item-to-total Correlations*
1. Helped me work through any worries or concerns related to my condition	.7751
2. Made me feel confident I can take medicines and can do what else was asked	.6351
3. Acted in a warm and friendly manner	.5622

*Cronbach's alpha = .7981

subject if the doctor and pharmacist "helped me work through any worries or concerns related to my condition" was modified to make it more specific to medications, that is, "helped me work through any worries or concerns related to my medications." Also, another doctor and pharmacist appraisal medication-specific social support item needed to be generated, that is, "helped me become aware of things I didn't know about my medications." Finally, tangible items for doctor and pharmacist medication-specific social support needed to be generated. These items asked the subject if the doctor or pharmacist "helped me get the right medications" and if the doctor or pharmacist "helped me get the things I needed to take my medications the right way."

It was decided that the (most concerned) other person emotional and appraisal medication-specific social support items would read the same as the doctor and pharmacist emotional and appraisal medication-specific social support items. However, it was decided that the (most concerned) other person tangible medication-specific social support items would read differently from the doctor and pharmacist tangible medication-specific social support items. It was decided to modify the original (most concerned) other person tangible medication-specific social support item "helps me remember things such as taking my medicine, refilling prescriptions, and keeping doctor's appointments" to make it more specific to pharmacy, that is, "helped me remember things such as taking my medicine and refilling my prescriptions." Also, it was decided to modify the original (most concerned) other person tangible medication-specific social support item "helps me get to the doctor and the pharmacy" to make it more specific to pharmacy, that is, "helped me get to the pharmacy."

Study Phase II

After analyses of the Phase I data were completed, and a revised questionnaire was constructed, Phase II of the study began. This section of the chapter will begin with a description of the Phase

II sample. Then, results of the factor analyses of the medication adherence, stressor, perceived stress, and social support measures will be discussed. Then, results of the reliability analyses of the medication adherence, stressor, perceived stress, and social support measures will be discussed. Then, after the Phase II measures are described, five sets of hypotheses will be addressed.

Phase II Sample Description

For Phase II of the study, 700 usable questionnaires were needed for the analyses. In the pilot study there were forty-four responses to the one hundred mailed out questionnaires. Therefore, anticipating a forty-four percent response rate, a revised questionnaire was mailed out to 1,600 elderly outpatients having one or more prescriptions mailed to them from a large Veterans Administration Medical Center in north-central Florida. A week after each questionnaire was mailed out, a follow-up postcard was mailed to each subject who had been mailed a questionnaire.

As part of Phase II, the investigator answered phone calls from either the subjects or the subjects' care givers. Eighty phone calls were logged by the investigator. Fifty-four of these calls were placed because the follow-up card reached subjects before their questionnaire. Ten of these calls were placed because a subject had received the questionnaire, but when the subject got the postcard they had realized they had misplaced or lost the questionnaire and needed another one. Eight questions were about how to answer the items on the questionnaire and revolved around two areas of inquiry. First, subjects seemed upset about responding to the medication-related stressor item about 'medication taking being easy' and the medication-related stressor item about 'dealing with a problem the right way.' Respondents stated that these items seemed to 'trick' the subject somehow because they seemed 'the reverse' of the other items about medication problems. Second, subjects did not know how to answer the stressor item about a possible alcohol and/or smoking interaction when they did not use these substances. The investigator also received five telephone calls from subjects who had just received the follow-up postcard and felt they needed to tell the investigator they had already mailed in their questionnaire. One telephone call was from a subject who stated that he had been out of town for some time, and didn't know if it was too late to send the questionnaire. Another two telephone calls concerned an inability for the subject to respond and are discussed in the next paragraph.

Seven weeks after the last questionnaire had been mailed, and six weeks after the last follow-up postcard, 1,090 questionnaires had been returned. Ten questionnaires had been returned as undeliverable. One subject's wife called the investigator to state that the subject had just died. Also, another care giver called the investigator to report that the elderly outpatient was legally incompetent and would be unable to answer the questions. Given that twelve subjects could not be reached, the denominator was changed to calculate response rate from 1,600 to 1,588. The response rate was 1,090 divided by 1,588, or about 69%.

Twenty non-responders were followed-up by the investigator to identify specific reasons for non-response. Eight non-responders were back in the hospital as inpatients, while three stated that they did not respond to the study because they did not feel they had enough "medication problems" to merit participation. Nine non-responders refused to participate in the study. These non-responders who refused to participate, were also followed-up to establish their reasons for choosing not to participate. Two refused because they felt they did not have enough "medication problems" to merit inclusion in the study, while seven felt that they were too ill to complete the questionnaire and they stated they did not have someone to help them complete it.

After the data from the 1,090 questionnaires was entered into the database, the information from each subject's medication profile was entered into the computer. After this process was undertaken, 73 subjects were eliminated because they did not meet the study inclusion criteria for

Table 5.10 Phase II of Study Sample Description

Characteristic	n	Category	Frequency	Percent
Age	1017	65 to 74 ("young-old")	625	61.5
		75 to 84 ("middle-old")	368	36.2
		85 to 100 ("old-old")	368	2.3
Gender	1017	Male	989	97.2
		Female	28	2.8
Ethnicity	974	White	883	90.7
		Black	60	6.2
		Hispanic	17	1.7
		American Indian or Native Alaskan	13	1.3
		Asian or Pacific Islander	1	0.1
Income	887	Less than $5,000	44	4.0
		$5,000 to $9,999	175	16.1
		$10,000 to 14,999	227	20.8
		$15,000 to $19,999	145	13.3
		$20,000 to $24,999	111	10.2
		$25,000 to $29,999	68	6.2
		$30,000 to $34,999	48	4.4
		$35,000 to $39,000	25	2.3
		$Greater than $40,000	44	4.0
Self-rated Health	982	Poor	256	26.1
		Fair	462	47.0
		Good	216	22.0
		Very Good	40	4.1
		Excellent	8	0.8
Chronic Disease Score	1017	0 to 2	264	26.0
		3 to 5	331	32.5
		6 to 8	281	27.6
		9 to 11	120	11.8
		12 to 15	21	2.1

*The maximum number of responses that could have been obtained on each of these characteristics was 1017. However, some subjects did not wish to respond to some of these questions. For example, 130 subjects (12.8% of the Phase II sample) did not wish to reveal their income dropping n for the income characteristic from 1017 to 887.

one of three reasons: 1.) fifty-six were eliminated because they were less than 65 years old, 2.) twelve were eliminated because they were not taking any medications on a regular basis, and 3.) five were part of an investigational drug protocol and it was felt that the subjects might differ on their medication-taking behaviors. Therefore, a maximum of 1,017 valid responses could possibly be obtained on any one variable in the study. A description of the main study sample is presented in Table 5.10.

There were differences between the larger Phase II sample (Table 5.10) and the smaller Phase I sample (Table 5.2). Generally, the Phase II sample was older (61.5% "young-old') than the Phase I sample (70.3% "young-old"). Also, the Phase II sample had a more evenly distributed income. For example, the Phase II sample did not have as many subjects concentrated in the $5,000 to $9,000 category (16.1%) as did the Phase I sample (29.8%). Finally, the Phase II sample had both lower evaluations of their health and lower Chronic Disease Scores. For example, the Phase II sample had more subjects (47.0%) concentrated in the lower "fair" self-rated health category than the Phase I sample (34.4%). And, the Phase II sample had more subjects (32.5%) concentrated in lower "3 to 5" Chronic Disease Score category than the Phase I sample (24.5%).

There were no large differences between the larger Phase II sample and the smaller Phase I sample on ethnicity and gender. Furthermore, because of this lack of variability from white males, ethnicity and gender were eliminated from any further analyses.

Factor Analyses

Six factor analyses were undertaken to assess the dimensionality of each of the hypothesized subscales: 1.) medication adherence, 2.) subjective medication-related stressors, 3.) perceived medication stress, 4.) doctor medication-specific social support, 5.) pharmacist medication-specific social support, and 6.) most concerned other person medication-specific social support. Each factor analysis will be discussed in turn.

Medication adherence

A factor analysis was conducted to assess the dimensionality of the four medication adherence items. As hypothesized, they were unidimensional (see Table 5.11).

Subjective medication-related stressors

A factor analysis was conducted on the twenty-seven subjective medication-related stressors. It was hypothesized that items would load on one of three possible dimensions: 1.) informational, 2.) emotional, and 3.) instrumental. However, the factor analysis suggests that there may be as many as four dimensions among the subjective medication-related stressor items (Tables 5.12-5.15).

The first dimension appears to reflect problems associated with informational or instructional needs (Table 5.12) and will be referred to as the advising stressors. Five of the nine items that load on this dimension were *a priori* thought to belong to an informational dimension (i.e., items 2, 4, 6, 8, and 9). The other four items that also loaded on the first dimension were initially thought to belong to an emotional dimension (i.e., items 1, 3, 5 and 7). However, when grouped with the first five items, all these items as a group appear to reflect problems associated with being uninformed. Advising medication-related stressors will therefore represent the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a lack of advice or instructions about the particular medication(s) he or she is currently taking.

The second dimension appears to reflect emotional problems associated with feeling detached or isolated (Table 5.13) and will be referred to as isolating stressors. Five of the six items that load on this dimension were *a priori* thought to belong to an emotional dimension (i.e., items 1, 2, 3, 4, and 5). Item 6 was thought to belong to another dimension. However, when grouped with the other five items, all these items as a group appear to reflect problems associated with feeling isolated and

Table 5.11 Phase II Medication Adherence Items: Rotated Component Matrix using Principal Components Analysis with Varimax Rotation and Kaiser Normalization

	Component 1
1. Are you careless at times about taking your medicine?	.726
2. Do you forget to take your medicine?	.702
3. In the last 24 hours, have you missed a dose of medication?	.618
4. When you feel better do you sometimes stop taking your medicine?	.546

unable to talk to someone about their medications. Isolating medication-related stressors will therefore represent the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a felt inability to communicate his or her feelings about his or her current medication(s).

The third dimension reflects more instrumental problems associated with struggling to remain on a medication regimen (Table 5.14) and will be referred to as reminding stressors. Five of the six items that load on this dimension were a priori thought to belong to an instrumental dimension (i.e., items 1, 2, 4, 5 and 6). The third item was thought to belong to an informational dimension. However, when grouped with the other five items, all these items as a group appear to reflect problems associated with remaining on a medication taking schedule. Reminding medication-related stressors will therefore represent the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a felt incapacity to remain on his or her current medication schedule.

The remaining "dimension" was unexpected. The fourth dimension consisted of three items that were initially thought to load on an instrumental factor and will be referred to as obtaining stressors (Table 5.15). Alone these three items seem to reflect a dimension associated with the physical acquisition and taking of medications. Obtaining medication-related stressors will therefore represent the patient's extent of experiences with a subgroup of problems, irritants, or annoyances stemming from a felt incapacity to acquire his or her current medication(s) or items necessary to take his or her current medication(s) correctly.

Three items did not appear to load well on any of these factors. It was thought that two of these items would load on an emotional factor, that is, the item about 'medication taking being easy' and the item about 'dealing with a problem the right way.' Also, it was thought that another

Table 5.12 Phase II Advising Subjective Medication-related Stressors: Rotated Component Matrix using Principal Components Analysis with Varimax Rotation and Kaiser Normalization (Rotation converged in 9 iterations)

	Component					
	1	2	3	4	5	6
1. Had a side effect of your medication that has upset you	.765	.040	-.041	-.132	.168	-.064
2. Wondered if something that happened to you was a side effect of your medication	.760	.077	.031	-.100	.215	.019
3. Felt like you had a problem with your medication	.730	.183	.132	-.048	.171	-.089
4. Believed that your medication does not help you feel better	.631	.168	.206	-.019	.094	.030
5. Not felt confident about taking your medication as directed	.620	.315	.203	.026	.047	.025
6. Felt that you were taking too many medications	.605	.159	.317	.028	.014	.087
7. Thought of changing the dose of your medication because you did not feel right	.604	.164	.159	.009	.040	.021
8. Wondered why your medication was prescribed	.529	.357	.228	.162	-.036	.151
9. Wondered how long you will have to take your medication	.508	.292	.248	.062	-.122	.225

Table 5.13 Phase II Isolating Subjective Medication-related Stressors: Rotated Component Matrix using Principal Components Analysis with Varimax Rotation and Kaiser Normalization (Rotation converged in 9 iterations)

	Component					
	1	2	3	4	5	6
1. Felt that no one seemed really interested in your medication taking	.294	.749	.108	.007	-.026	-.094
2. Felt that no one listened to you about your medication problems	.309	.709	.110	.047	.047	-.100
3. Felt uncomfortable interrupting the pharmacist to ask a question	-.007	.616	.083	-.112	.274	.028
4. Been afraid to ask someone to better explain something about your medication	.212	.604	.146	.120	.035	.136
5. Felt that no one could help you deal with your medication problems	.484	.525	.009	.099	.055	.142
6. Wondered whether a medication given to you by one doctor should be taken with a medication given to you by a different doctor	.329	.351	.276	-.011	.133	-.006

Table 5.14 Phase II Reminding Subjective Medication-related Stressors: Rotated Component Matrix using Principal Components Analysis with Varimax Rotation and Kaiser Normalization (Rotation converged in 9 iterations)

	Component					
	1	2	3	4	5	6
1. Needed something to remind you to take your medications on time	.149	-.018	.757	-.028	.017	-.048
2. Needed something to remind you to have your medications refilled on time	.137	.074	.698	.018	.117	.013
3. Not known what to do if you missed a dose of medication	.048	.197	.579	.018	.183	.252
4. Had trouble keeping track of how well your medication is working	.365	.225	.479	.024	-.013	.131
5. Needed an up-to-date list of your medications to show all your doctors	.269	.265	.457	-.026	.194	-.148
6. Needed easy to read information about your medications	.318	.314	.337	-.098	.276	.063

Table 5.15 Phase II Obtaining Subjective Medication-related Stressors: Rotated Component Matrix using Principal Components Analysis with Varimax Rotation and Kaiser Normalization (Rotation converged in 9 iterations)

	Component					
	1	2	3	4	5	6
1. Had difficulty swallowing your your medication	.240	-.068	.007	.051	.619	.187
2. Had difficulty opening a medication container	.036	.258	.205	-.025	.608	.043
3. Had difficulty getting transportation to a pharmacy	.134	.120	.253	.109	.475	-.266

item would load on an informational factor, that is, about "if you should drink alcohol or smoke while taking medication." But, from the telephone conversations the principal investigator had with subjects or their care givers it seems these items were problematic. First, subjects seemed upset about responding to these first two stressor items because these items seemed designed to 'trick' the subject somehow because they seemed 'the reverse' of the other items about medication problems. Second, subjects did not know how to answer the stressor item about a possible alcohol and/or smoking interaction when they did not use these substances. Given the discussions with subjects and their care givers about the last three items, these three items were dropped from further analyses.

Perceived medication stress

A separate factor analysis was undertaken to assess the dimensionality of the perceived medication stress items. The four items were unidimensional (Table 5.16).

Medication-specific social support

Three factor analyses were undertaken to assess the dimensionality of doctor, pharmacist, and (most concerned) other person medication-specific social support. The six medication-specific social support items for the doctor, pharmacist, and (most concerned) other person were hypothesized to load similarly (two items per dimension) on three possible dimensions: 1.) appraisal, 2.) emotional, and, 3.) tangible.

The results of the factor analyses for doctor, pharmacist, and (most concerned) other person medication-specific social support are summarized in Tables 5.17-5.19. For the doctor, the pharmacist, and the (most concerned) other person the results were similar ("Full Matrix"). One of the items that was hypothesized to load on an appraisal dimension (e.g., "helped me become aware of things I didn't know about my medications") loaded on both component 1 and 2 for each of the

Table 5.16 Phase II Perceived Medication Stress Items: Rotated Component Matrix using Principal Components Analysis with Varimax Rotation and Kaiser Normalization

	Component
	1
1. Feelings of being overwhelmed by your medication regimen	.891
2. Feelings of discouragement with your medication regimen	.870
3. Worries or concerns about reactions between two or more medications	.799
4. Feelings of guilt or anxiety when you got off track with your medication taking.	.776

Table 5.17 Phase II Doctor Medication-specific Social Support: Rotated Component Matrices using Principal Components Analysis with Varimax Rotation and Kaiser Normalization*

Full Matrix

	Component			
	1	2	3	4
1. Helped me fully understand when and how to follow my medication treatment	.277	.842	.328	.235
2. Helped me become aware of things I didn't know about my medications	.646	.576	.137	.278
3. Helped me feel confident I can take my medicines	.502	.398	.470	.374
4. Helped me work through and worries or concerns related to my medications	.833	.234	.315	.279
5. Helped me get the right medications	.248	.256	.882	.239
6. Helped me get the things I needed to take my medications the right way	.318	.259	.277	.865

Reduced Matrix

	Component			
	1	2	3	4
1. Helped me fully understand when and how to follow my medication treatment	.272	.884	.255	.283
2. Helped me work through and worries or concerns related to my medications	.261	.295	.303	.868
3. Helped me get the right medications	.897	.262	.258	.243
4. Helped me get the things I needed to take my medications the right way	.269	.257	.881	.293

*In the full matrix, all items were included. Before the reduced matrix was calculated, items 2 and item 3 were eliminated because of high loadings on more than one component.

Table 5.18 Phase II Pharmacist Medication-specific Social Support: Rotated Component Matrices using Principal Components Analysis with Varimax Rotation and Kaiser Normalization*

Full Matrix

	Component			
	1	2	3	4
1. Helped me fully understand when and how to follow my medication treatment	.837	.345	.272	.268
2. Helped me become aware of things I didn't know about my medications	.686	.547	.253	.262
3. Helped me feel confident I can take my medicines	.538	.667	.293	.301
4. Helped me work through and worries or concerns related to my medications	.393	.789	.289	.311
5. Helped me get the right medications	.267	.266	.879	.291
6. Helped me get the things I needed to take my medications the right way	.321	.342	.372	.801

Reduced Matrix

	Component			
	1	2	3	4
1. Helped me fully understand when and how to follow my medication treatment	.271	.853	.280	.348
2. Helped me work through and worries or concerns related to my medications	.290	.395	.324	.809
3. Helped me get the right medications	.881	.255	.312	.248
4. Helped me get the things I needed to take my medications the right way	.372	.303	.818	.318

*In the full matrix, all items were included. Before the reduced matrix was calculated, items 2 and item 3 were eliminated because of high loadings on more than one component.

Table 5.19 Phase II Other Person Medication-specific Social Support: Rotated Component Matrices using Principal Components Analysis with Varimax Rotation and Kaiser Normalization*

Full Matrix

	Component			
	1	2	3	4
1. Helped me fully understand when and how to follow my medication treatment	.718	.358	.464	.296
2. Helped me become aware of things I didn't know about my medications	.761	.479	.255	.275
3. Helped me feel confident I can take my medicines	.465	.716	.303	.337
4. Helped me work through and worries or concerns related to my medications	.440	.695	.420	.276
5. Helped me remember things such as taking my medicine and refilling my prescriptions	.331	.334	.816	.318
6. Helped me get to the pharmacy	.252	.256	.262	.895

Reduced Matrix

	Component			
	1	2	3	4
1. Helped me become aware of things I didn't know about my medications	.280	.832	.326	.352
2. Helped me feel confident I can take my medicines	.322	.460	.352	.749
3. Helped me remember things such as taking my medicine and refilling my prescriptions	.319	.313	.850	.278
4. Helped me get to the pharmacy	.899	.243	.281	.231

*In the full matrix, all items were included. Before the reduced matrix was calculated, items 2 and item 3 were eliminated because of high loadings on more than one component.

three "helpers." Also, one of the items that was hypothesized to load on an emotional dimension (e.g., "helped me feel confident I can take my medicines") loaded on both component 1 and 2 for each of the three "helpers."

After these preliminary analyses, the items that loaded on both component 1 and 2 were dropped, and the three follow-up analyses were run again ("Reduced Matrix"). Again, the second analyses were similar for all three "helpers." All four items loaded separately on one of the four components. Even the two items that were both hypothesized to load on a tangible dimension loaded on separate components.

Because of these unexpected results, that is, having one item to represent one of the four kinds of support as opposed to two items to represent one of the three kinds of support, it was decided to rename the kinds of support to distinguish them from what had been hypothesized earlier. The "helped me fully understand when and how to follow my medication treatment" item was termed consultation medication-specific social support. The "helped me work through and worries or concerns related to my medications" item was termed affirmation medication-specific social support. The "helped me get the right medications" item was termed acquisition medication-specific social support. And, the "helped me get the things I needed to take my medications the right way" item was termed actuation medication-specific social support.

Reliability Analyses

As discussed in the last section, the factor analyses for doctor, pharmacist and (most concerned) other person medication-specific social support yielded unexpected results since the kinds of medication-specific social support (consultation, affirmation, actuation, and acquisition) will be represented by one item instead of two items. However, three separate reliability analyses were undertaken on the three remaining item sets. Each will be discussed in turn.

Table 5.20 Phase II Medication Adherence Items: Reliability Coefficients and Item-to-total Correlations (n=971)

	Item-to-total Correlations*
1. Are you careless at times about taking your medication?	.4139
2. Do you forget to take your medicine?	.3797
3. In the last 24 hours, have you missed a dose of medication?	.3064
4. When you feel better do you sometimes stop taking your medicine?	.2453

*Cronbach's alpha = 0.5435

Table 5.21 Phase II Advising Subjective Medication-related Stressor Items: Reliability Coefficients and Item-to-total Correlations (n = 928)

	Item-to-total Correlations*
1. Felt like you had a problem with your medication	.6602
2. Wondered if something that happened to you was a side effect of your medication	.6442
3. Not felt confident about taking your medication as directed	.6289
4. Believed that your medication does not help you feel better	.6043
5. Had a side effect of your medication that has upset you	.5959
6. Felt that you were taking too many medications	.5795
7. Wondered why your medication was prescribed	.5718
8. Thought of changing the dose of your medication because you did not feel right	.5380
9. Wondered how long you will have to take your medication	.5146

*Cronbach's alpha = 0.8573

Table 5.22 Phase II Isolating Subjective Medication-related Stressor Items: Reliability Coefficients and Item-to-total Correlations (n=943)

	Item-to-total Correlations*
1. Felt that no one seemed really interested in your medication taking	.6190
2. Felt that no one listened to you about your medication problems	.6194
3. Been afraid to ask someone to better explain something about your medication	.4645
4. Felt that no one could help you deal with your medication problems	.3466

*Cronbach's Alpha = 0.7170

Table 5.23 Phase II Reminding Subjective Medication-related Stressor Items: Reliability Coefficients, and Item-to-total Correlations (n=956)

	Item-to-total Correlations*
1. Needed something to remind you to have your medications refilled on time	.4962
2. Needed something to remind you to take your medications on time	.4853
3. Needed an up-to-date list of your medications to show all your doctors	.4423
4. Had trouble keeping track of how well your medication is working	.4332
5. Not known what to do if you missed a dose	.4180

*Cronbach's Alpha = 0.6967

Table 5.24 Phase II Obtaining Subjective Medication-related Stressor Items: Reliability Coefficients, and Item-to-total Correlations (n=961)

	Item-to-total Correlations*
1. Had difficulty opening a medication container	.2389
2. Had difficulty getting transportation to a pharmacy	.2272
3. Had difficulty swallowing your medication	.1988

*Cronbach's Alpha = 0.3778

Table 5.25 Phase II Perceived Medication Stress Items: Reliability Coefficients and Item-to-total Correlations (n=964)

	Item-to-total Correlations*
1. Feelings of being overwhelmed by your medication regimen	.7752
2. Feelings of discouragement with your medication regimen	.7389
3. Worries or concerns about reactions (between two or more medications)	.6498
4. Feeling guilty or anxious when you get off track with your medication	.6220

*Cronbach's alpha = 0.8531

The first reliability analysis was conducted on the four medication adherence items. Cronbach's alpha was 0.5435 (Table 5.20). The item "when you feel better do you sometimes stop taking your medicine" had a low item-to-total correlation of 0.2453. Despite the poor Cronbach's alpha and low item-to-total correlations, it was decided to retain all the medication adherence items given the exploratory nature of the study.

The results from the reliability analyses conducted on the subjective medication-related stressor items are summarized in Table 5.21-5.24. The first three dimensions each have a good Cronbach's alpha and each have good item-to-total correlations. However, the fourth dimension appears to suffer from a poor Cronbach's alpha and low item-to-total correlations. Despite the poor Cronbach's alpha and low item-to-total correlations, it was decided to retain this fourth dimension given the exploratory nature of the study.

The last reliability analysis was conducted on the four perceived medication stress items. Cronbach's alpha was 0.8531 (Table 5.25).

Phase II Measure Descriptions

Phase II study measure descriptions are summarized in Table 5.26. It appears that on a scale from one to four, four being perfect medication adherence, that the subjects rated themselves as a group very high (i.e., mean = 3.42, standard deviation = 0.90). Furthermore, it appears that on a scale from four to twenty-four, twenty-four being the highest rating of perceived stress, these subjects rated themselves as a group rather low (i.e., mean = 8.33, standard deviation = 5.04). Also, the subjects did not seem to rate themselves as a group very high on the three types of stressors. Furthermore, the subjects seemed to rate all the different types of medication-specific social support from the doctor, pharmacist, and (most concerned) other person a little higher than half-way up on a scale from one to five, one being "none" and five being "a great deal of support."

Table 5.26 Descriptions of Phase II Measures

	n*	# of items	Mean	Median	Min	Max	S.D.
Medication Adherence	971	4	3.42	4	0	4	0.90
Objective Stressors							
Number of Prescriptions	1017	1	8.23	8	1	33	4.58
Subjective Stressors							
Advising	928	9	14.12	13	9	36	4.63
Isolating	943	4	5.51	5	4	16	2.10
Reminding	956	5	7.77	7	5	20	2.63
Obtaining	961	3	4.26	4	3	12	1.50
Perceived Stress	964	4	8.33	7	4	24	5.04
Doctor Support							
Consultation	975	1	3.84	4	1	5	1.11
Affirmation	978	1	3.44	4	1	5	1.32
Actuation	958	1	3.69	4	1	5	1.31
Acquisition	976	1	4.08	4	1	5	1.05
Pharmacist Support							
Consultation	973	1	2.84	3	1	5	1.55
Affirmation	958	1	2.48	2	1	5	1.52
Actuation	955	1	2.72	3	1	5	1.56
Acquisition	962	1	3.07	3	1	5	1.58
Other Person Support							
Consultation	962	1	2.96	3	1	5	1.58
Affirmation	961	1	3.19	4	1	5	1.59
Actuation	969	1	3.38	4	1	5	1.59
Acquisition	952	1	3.06	3	1	5	1.68

*n are different for different measures because some subjects chose not answer the question.

Kolmogorov-Smirnov tests were conducted on each of the scales to test the normality of their distributions. Each test of normality passed with the Lilliefors correction to test for significance.

Content of the Four Scales

With the possible exception of the perceived medication stress scale, more items for each of the scales should have been included in this study. The content of each of the scales will be discussed in turn.

Medication adherence

One of the items in the self-report measure concerning adherence when feeling worse was not used for the revised questionnaire, because of a poor item-to-total correlation generated during Phase I of the study. In retrospect, it might have been wise to have included the item despite this poor item-to-total correlation, as the inclusion of this item wouldn't have posed a substantial increase in response burden, and may have generated a better item-to-total correlation in Phase II of the study. Furthermore, it was decided to included a 24-hour recall item to improve the scale's Cronbach's alpha. Similarly, it might have been wise to have included items from other self-report medication adherence measures. For example, another self-report scale could have been included which asks the subject about intentional and unintentional reasons for not taking their medication (Brooks et al., 1994). Perhaps, instead of relying on only two measures in this study, a battery of scales could have been employed to improve the measurement of medication adherence.

Medication-related stressors

Four of the items were not used for the revised questionnaire, because of a poor item-to-total correlation generated during Phase I of the study. In retrospect, these items might have been included concerning: 1.) timeliness of refills, 2.) nonprescription medications, 3.) agreement with feeling that a drug was unnecessary, and 4.) understanding of one's embarrassment when taking a drug in front of other people. The inclusion of these items wouldn't have posed a substantial increase in response burden, and may have generated a better item-to-total correlation in Phase II of the study. Furthermore, it would have been helpful to have included a few more items that reflect the obtaining medication-related stressor dimension to improve the reliability of the measure using Cronbach's alpha.

Perceived medication stress

The four items that were adapted for use in this study appear to reflect the domain adequately. However, this doesn't rule out the possibility that another dimension to perceived medication stress couldn't exist and that items for this other dimension might need to be generated in a future study.

Medication-specific social support

Items for this scale were adapted from a previous study and it was hypothesized that three distinct subscales (appraisal, emotional, and tangible) would exist for each "helper" (doctor, pharmacist, and other person). It was thought that a factor analysis would reveal two items for each subscale. However, two items were dropped from the scale because of higher inter correlations between subscales. Furthermore, two items that were thought to belong to a single subscale, seemed to belong to different dimensions. It would have been helpful to have included more items that reflect the possible dimensions that were found in Phase II of the study (i.e., consultation, affirmation, actuation and acquisition).

Construct-related Validation of the Scales

Generally, it appears that the low reliability of some of the measures used, set the upper limit on the size of the correlation that could be obtained between the measures (Thorndike, Cunningham, Thorndike, and Hagen, 1991). This attenuation due to unreliability should be addressed in a follow-up study by the inclusion of more carefully chosen items to increase Cronbach's alpha.

The unexpected results from the Varimax Rotation and Kaiser Normalization have been already been discussed for the medication-specific social support scale. However, convergent and discriminant validity needs to be addressed by examining the subjective medication-related stressors scale and the medication-specific social support scale in turn.

Items on each stressor subscale were examined for convergent and discriminant validity. It was demonstrated that there were stronger correlations among items on each of these subscales than with items on the other subscales. Furthermore, it was demonstrated that there were stronger correlations between items on these subscales, than between items on these subscales and the items on the perceived stress scale. Also, it was demonstrated that there were stronger associations among items on these subscales, than between items on these subscales and the items on the medication adherence scale.

Unfortunately, each item making up the medication-specific support seemed to be associated with every type of medication-related stressor. This may either reflect a poor choice of items, or a global response to all the medication-specific social support items by the respondents.

Testing of the Five Sets of Hypotheses

Five sets of hypotheses will be discussed in turn. Testing of these five sets of hypotheses will help establish validity for each of the four scales and the proposed model.

The first set of hypotheses will involve some preliminary hypothesized relationships between the exogenous and endogenous variables in nucleus of the Stress Model of Medication Adherence. The results will be given and discussed. This will set the stage for a more thorough examination of hypothesized mediating and moderating effects.

The second set of hypotheses will involve hypothesized mediating effects. The last three sets will involve hypothesized moderating effects.

First set of hypotheses

The first set of hypotheses will examine zero-order correlations (from Table 5.27) to answer the following set of hypotheses. These hypotheses deal with hypothesized associations between exogenous and endogenous variables in the "nucleus" Stress Model of Medication Adherence. An examination of these associations will help validate the model by comparing it with what has been found in other more general studies.

Hypothesis 1A_1: Advanced age is not associated with medication adherence.

As hypothesized, advanced age was not associated with medication adherence. Spiers and Kutzik (1995) found, among independently living persons at least 55 years of age participating in a "brown-bag" medication review, that age was the best predictor of medication-related problems. However, contrary to what is often believed, as a group these patients try harder to comply with medications in general than do younger patients (Klein, 1988), even in the presence of bothersome problems.

Hypothesis 1A_2: Advanced age is positively associated with obtaining and reminding (instrumental) medication-related stressors.

As hypothesized, advanced age was positively associated with obtaining medication-related stressors (r=.089). Older adults seem to experience motor difficulties that are problematic to obtaining or doing mechanical tasks associated with their medications. In one study, almost half of the noninstitutionalized elderly were found limited in mobility because of chronic conditions, especially heart disease and arthritis (Rice and Estes, 1984). Decreased activity and dexterity can limit a person ability and willingness to have prescriptions filled, take difficult to swallow drugs regularly, and open and close the childproof containers that, to arthritic hands are unmanageable

Table 5.27 Correlations between Subject Characteristics, Health Status, Medication Adherence, Number of Medications, Type of Stressors, and Perceived Stress

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Age										
2. Income	-.036									
Health Status										
3. Self-rated	.033	.140**								
4. CDS	-.038	.026	-.286**							
5. Medication Adherence	-.015	-.010	.044	-.029						
6. Number of Medications	-.059	.077*	-.342**	.654**	-.011					
Stressors										
7. Advising	-.092**	.054	-.216**	.187**	-.316**	.211**				
8. Isolating	-.038	-.030	-.154**	.026	-.177**	.075*	.527**			
9. Reminding	.024	.064	-.192**	.162**	-.449**	.203**	.532**	.426**		
10. Obtaining	.089**	-.028	-.218**	.152**	-.172**	.199**	.357**	.287**	.401**	
11. Perceived Stress	-.023	.048	-.189**	.163**	-.295**	.203**	.632**	.454**	.489**	.310**

(Mallet, 1992).

Contrary to what was hypothesized, advanced age was not associated with reminding stressors. It may be that for this sample, they have been taking their medications for so long that they established routines or cues to help them remember to take their medications.

Hypothesis 1A_3: Advanced age should be positively associated with (advising) informational medication-related stressors.

Contrary to what was hypothesized, advanced age was negatively associated with advising stressors ($r=-.092$). This finding seems to disagree with the literature suggesting that older adults experience difficulties with information when taking their medication. A study has suggested that the failing eyesight of older adults reduces their ability to read small print on prescription labels and package inserts (Dirckx, 1979). Also, another study suggests that about 30% of the population aged 65 years and older suffer significant hearing loss (National Center for Health Statistics, 1985). Hearing loss limits patients' ability to hear directions for appropriate drug use and discourages them from asking questions (Ebersole and Hess, 1981). Also, the concept of "intelligent noncompliance" may be of special relevance to the elderly lacking proper information, for older people may omit medications in order to compensate for physiological changes accompanying aging or disease - changes that make them more vulnerable to adverse drug reactions that may be unrecognized by their physicians (Lipton and Lee, 1988). Furthermore, memory of information has been shown to decline with age and information may have to be repeated by the health care provider during each visit (Light, 1991; Salthouse, 1991). What this finding seems to suggest is that as the subjects advance in age, they do not have as many of these advising medication-related stressors. Perhaps, they have been on their chronic medication regimens for so long that they feel more information is unnecessary. This confusion might be resolved in a future study including a duration of medication regimen variable.

Hypothesis $1B_1$: Higher income is not associated with medication adherence.

As hypothesized, an association was not found between income and medication adherence. However, it must be clear that in this study most subjects had service connected disabilities and did not have to pay for their medications. The medication adherence rate might have been significantly different if the study was replicated using subjects who had to pay for their medications. Hattaway (1996) has reported the impact of the high cost of prescriptions on medication nonadherence among the elderly. In addition, the failure of Medicare to cover the cost of prescription drugs is widely perceived to be a primary factor in medication nonadherence (Arnold et al., 1995).

Hypothesis $1B_2$: Higher income is not associated with perceived medication stress.

As hypothesized, an association was not found between income and perceived stress. This finding seems to agree with a study that examined the effects of demographic and socioeconomic variables on perceived stress in work and nonwork environments (Bednar, Marshall, and Bahouth, 1995). However, it is interesting to point out that in another closely related study, an inverse relationship was found between economic satisfaction and perceived stress. It would seem that perceived stress has more to do with a person's satisfaction with their economic situation than their actual income (Krannich, Riley, and Leffler, 1988).

Hypothesis $1C_1$: Poor health status is not associated with medication adherence.

As hypothesized, an association was not found between poor health status [using lower self-rated health and higher Chronic Disease Score to indicate poor health status] and medication adherence. This has been confirmed in a recent study among 1,028 elderly patients (Coons et al., 1994).

Hypothesis 1C$_2$: Poor health status is associated with advising (informational) medication-related stressors.

As hypothesized, poor health status was associated with a higher score on the advising medication-related stressor subscale [lower self-rated health (r=-.216), higher Chronic Disease Score (r=.187)] . Subjects with a lower self-rating of their own health or more diseases states seem to be concerned about their medication taking and therefore seek out needed information.

Hypothesis 1C$_3$: Poor health status is associated with obtaining and reminding (instrumental) medication-related stressors.

As hypothesized, poor health status was associated with a higher score on the obtaining medication-related stressor subscale [lower self-rated health (r=-.218), higher Chronic Disease Score (r=.152)] and reminding medication-related stressor subscale [lower self-rated health (r=-.192), higher Chronic Disease Score (r=.162)] . Subjects with poor health status seem to experience more stressors involving getting their medications, taking them, and remaining on their medication schedules.

Hypothesis 1C$_4$: Poor health status is associated with isolating (emotional) medication-related stressors.

As hypothesized, poor health status was associated with a higher score on the isolating subscale [lower self-rated health (r=-.154)]. However, poor health (as measured more objectively with the Chronic Disease Score) did not demonstrate an association. This seems to suggest that unless a subject subjectively senses their deteriorating health, the subject will not experience an increase in problems related to communicating with other people concerns about their medications.

Hypothesis $1C_5$: Poor health status is associated with perceived medication stress

As hypothesized, poor health status was associated with perceived medication stress [lower self-rated health ($r=-.189$), higher Chronic Disease Score ($r=.163$)]. This is in agreement with a study that found a negative association between self-rated health status and perceived stress (Chwalisz and Kisler, 1995). However, it should be noted that in a separate study, it was found that the strength of this association decreases over time (Schulz et al., 1995). This suggests that upon the first occurrence of one or more morbidities, a patient's perceived stress may be higher than it will be at a future point in time as he or she gets accustomed to living with their condition(s).

Second set of hypotheses

This second set of hypotheses revolve around the prediction that perceived stress will mediate the relationship between type of stressors and medication adherence. To begin this set of hypotheses, the zero order correlations (Table 5.27) are examined between the primary variables (i.e., medication adherence, type of stressors and perceived stress). Then, the associations between the subject's age, income, health status (self-rated health and Chronic Disease score) and the primary variables are reexamined using beta coefficients (Table 5.28). After this examination of main effects, the hypothesized mediating effects of perceived stress on the relationship between type of stressors and medication adherence will be analyzed.

To test for the mediating effects of perceived stress, a series of multiple regression analyses were conducted, and the strengths of the paths were estimated. According to Baron and Kenny (1986), the mediating effects can be substantiated by three regression equations. First, type of stressors (the independent variable) must affect perceived stress (the mediator variable). Second, type of stressors (the independent variable) must affect the dependent variable (medication adherence) in the second equation. Finally, perceived stress (the mediator variable) must affect medication adherence (the dependent variable) in the third regression equation. Perfect mediation would hold if type of stressors (the independent variable) has no effect on medication adherence (dependent variable) when perceived stress (the mediator) is controlled in this manner. But, if the residual path is not zero, this would indicate the operation of multiple mediating factors, and that the type of stressors variables are mediator candidates, albeit not both a necessary and a sufficient candidate for an effect to occur.

The transformation of raw scores to deviation scores for use in the regressions to follow have been recommended as a cure for the multicollinearity problem (high correlation between the product-term and one or more of its constituents) that often arises with the use of untransformed (raw) scores (e.g., Finney, Mitchell, Cronkite & Moos, 1984). However, deviation scores have the problem of having results which are difficult to interpret. Therefore, regressions using raw scores are used here too. Although deviation scores will reduce the product-term's correlation with the constituent variables, multicollinearity seems to pose no threat to the analysis of interaction or main effects unless the correlation is so high as to produce rounding errors in computer calculations (e.g., Cronbach and Snow, 1977).

Although this path-analytic method cannot rule out alternative causal explanations or reciprocal effects, if mediating effects are found here they might provide important information about links between the variables in the stress model. But, because of the cross-sectional nature of the present study, all proposed mediational effects are considered exploratory.

Hypothesis $2A_1$: There will be positive main effect between advising stressors and perceived stress, a negative main effect between advising stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Correlation analyses were used to examine the hypothesized main effects between the advising stressors, perceived stress, and medication adherence (Table 5.27). A positive main effect was found between advising stressors and perceived stress ($r = .632, p < .001$). And, a negative association was found between advising stressors and medication adherence ($r = -.316, p < .001$). Finally, perceived stress was negatively associated with medication adherence ($r = -.295, p < .001$).

Hypothesis $2A_2$: There will be positive main effect between isolating stressors and perceived stress, a negative main effect between isolating stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Correlation analyses were used to examine the hypothesized main effects between the isolating stressors, perceived stress, and medication adherence (Table 5.27). A positive main effect was found between isolating stressors and perceived stress ($r=.454, p<.001$). Also, a negative association was found between isolating stressors and medication adherence ($r = -.177, p < .001$). Finally, perceived stress was negatively associated with medication adherence ($r=-.295, p < .001$).

Hypothesis $2A_3$: There will be positive main effect between reminding stressors and perceived stress, a negative main effect between reminding stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Correlation analyses were used to examine the hypothesized main effects between the reminding stressors, perceived stress, and medication adherence (Table 5.27). A positive main effect was found between reminding stressors and perceived stress ($r = .489, p < .001$). Also, a negative association was found between reminding stressors and medication adherence ($r = -.449, p < .001$). Finally, perceived stress was negatively associated with medication adherence ($r = -.295, p < .001$).

Hypothesis $2A_4$: There will be positive main effect between obtaining stressors and perceived stress, a negative main effect between obtaining stressors and medication adherence, and a negative main effect between perceived stress and medication adherence.

Correlation analyses were used to examine the hypothesized main effects between the obtaining stressors, perceived stress, and medication adherence (Table 5.27). A positive main effect was found between obtaining stressors and perceived stress (r = .310, p < .001). Also, a negative association was found between obtaining stressors and medication adherence (r = -.172, p < .001). Finally, perceived stress was negatively associated with medication adherence (r = -.295, p < .001).

Hypothesis 2B: The associations between the exogenous and endogenous variables found earlier using zero-order correlations may no longer be significant when using multiple regression.

According to Table 5.28 the association between advanced age and obtaining stressors remains significant (beta=.122, p<.001) when using multiple regression. However, the negative association between advanced age and advising stressors no longer remains significant. Also, it is interesting to note that the significant associations found between poor health status (using self-rated health and Chronic Disease Score) and medication-related stressors using zero-order correlations remain significant when using multiple regression. Note that an association between Chronic Disease Score and isolating stressors was not significant using either a univariate or multivariate analysis. Finally, the association between income and perceived stress that was not significant using zero order correlations, does become significant when using multiple regression. This suggests that income (or socioeconomic status) might have a positive association with a subjects' generation of evaluations of problems taking medications.

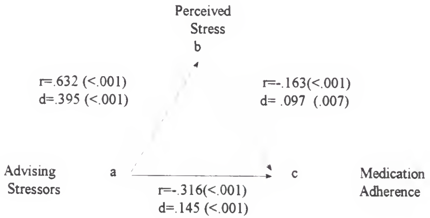
Hypothesis $2C_1$: There will be a mediating effect of perceived stress on the relationship between advising stressors and medication adherence.

Three sets of regression equations were used to test for the mediating effect of perceived stress on the relationship between advising stressors and medication adherence. First, advising stressors (the independent variable) affected perceived stress (the mediator variable) in the first set of

Table 5.28 Multiple Regression Analysis of Elderly Outpatient's Age, Income, Self-rated Health Status and Chronic Disease Score on Advising Stressors, Isolating Stressors, Reminding Stressors, Obtaining Stressors, Perceived Stress and Medication Adherence using Raw Scores

Sociodemographic Variables	Beta(significance)					
	Stressors				Perceived Stress	Medication Adherence
	Advising	Isolating	Reminding	Obtaining		
Age	-.061(.068)	-.023(.507)	.059(.076)	.122(<.001)	.003(.925)	-.039(.259)
Income	.073(.030)	-.009(.785)	.088(.009)	-.001(.973)	.071(.036)	-.019(.585)
Self-rated Health	-.195(<.001)	-.162(<.001)	-.186(<.001)	-.192(<.001)	-.181(<.001)	.057(.114)
Chronic Disease Score	.128(<.001)	-.023(.527)	.111(.001)	.100(.004)	.097(.005)	-.010(.777)
R^2 of model	.076	.026	.064	.072	.053	.005
F of model	17.127	5.572	14.698	16.505	12.117	1.076
p-value of model	.000	.000	.000	.000	.000	.367

Figure 5.1 Path diagram using multiple regression with raw scores (r) and deviation scores (d) for testing the effects of perceived stress on the relationship between advising stressors and medication adherence

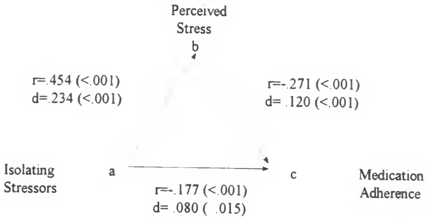


regression equations (using raw scores beta=.632, p<.001; using deviation scores beta=.395, p<.001). Second, advising stressors (the independent variable) affected the dependent variable (medication adherence) in the second set of equations (using raw scores beta=-.316, p<.001; using deviation scores beta=.145, p<.001). And, in the third set of regression equations perceived stress (the mediator variable) affected medication adherence (the dependent variable) (using raw scores beta=-.163, p<.001; using deviation scores beta=.097, p=.007). Since all these regressions held in the predicted direction, the effect of advising stressors (the independent variable) on medication adherence (the dependent variable) had to be found less in the third set of equations (using raw scores beta=-.215, p<.001; using deviation scores beta=.105, p=.003) than in the second set of equations (using raw scores beta=-.316, p<.001; using deviation scores beta=.145, p<.001). Perfect mediation would have held if advising stressors (the independent variable) had no effect when perceived stress (the mediator) was controlled in this manner. Since the residual path is not zero, this indicates the operation of multiple mediating factors, and that the advising stressors variable is a mediator candidate, albeit not both a necessary and a sufficient candidate for an effect to occur.

Hypothesis $2C_2$: There will be a mediating effect of perceived stress on the relationship between isolating stressors and medication adherence.

Three sets of regression equations were used to test for the mediating effect of perceived stress on the relationship between isolating stressors and medication adherence. First, isolating stressors (the independent variable) had an effect on perceived stress (the mediator variable) in the first set of regression equations (using raw scores beta=.454, p<.001; using deviation scores beta=.234, p<.001). Second, isolating stressors (the independent variable) had an effect on the dependent variable (medication adherence) in the second set of equations (using raw scores beta=-.177,

Figure 5.2 Path diagram using multiple regression with raw scores (r) and deviation scores (d) for testing the effects of perceived stress on the relationship between isolating stressors and medication adherence

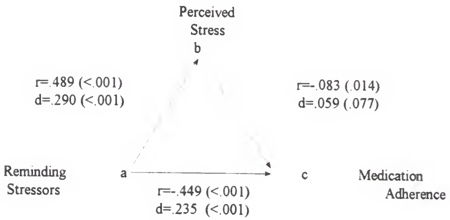


p<.001;using deviation scores beta=.080, p=.015). And, in the third regression set of equations perceived stress (the mediator variable) had an effect on medication adherence (the dependent variable) (using raw scores beta=- 271, p<.001; using deviation scores beta=.120, p<.001). Since all these regressions held in the predicted direction, the effect of isolating stressors (the independent variable) on medication adherence (the dependent variable) had to be found less in the third set of equations (using raw scores beta=-.055, p=.120; using deviation scores beta=.056, p=.101) than in the second set of equations (using raw scores beta=-.177, p<.001; using deviation scores beta=.080, p=.015). Perfect mediation would have held if isolating stressors (the independent variable) had no effect when perceived stress (the mediator) was controlled in this manner. Since the residual path is not zero, this indicates the operation of multiple mediating factors, and that the isolating stressors variable is a mediator candidate, albeit not both a necessary and a sufficient candidate for an effect to occur.

Hypothesis $2C_3$: There will be a mediating effect of perceived stress on the relationship between reminding stressors and medication adherence.

Three sets of regression equations were used to test for the mediating effect of perceived stress on the relationship between reminding stressors and medication adherence. First, reminding stressors (the independent variable) had an effect on perceived stress (the mediator variable) in the first regression equation (using raw scores beta=.489, p<.001; using deviation scores beta=.290, p<.001). Second, reminding stressors (the independent variable) had an effect on the dependent variable (medication adherence) in the second set of equations (using raw scores beta=-.449, p<.001;using deviation scores beta=.235, p<.001). And, in the third regression set of equations perceived stress (the mediator variable) had an effect on medication adherence (the dependent variable) (using raw scores beta=-.083, p=.014; using deviation scores beta=.059, p=.077). Since

Figure 5.3 Path diagram using multiple regression with raw scores (r) and deviation scores (d) for testing the effects of perceived stress on the relationship between reminding stressors and medication adherence

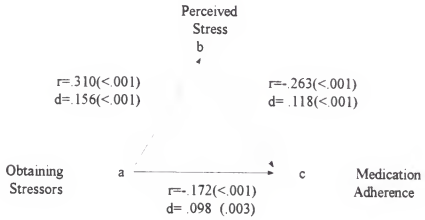


all these regressions held in the predicted direction, the effect of reminding stressors (the independent variable) on medication adherence (the dependent variable) had to be found less in the third set of equations (using raw scores beta=-.412, p<.001; using deviation scores beta=.221, p<.001) than in the second set of equations (using raw scores beta=-.449, p<.001; using deviation scores beta=.235, p<.001). Perfect mediation would have held if reminding stressors (the independent variable) had no effect when perceived stress (the mediator) was controlled in this manner. Since the residual path is not zero, this indicates the operation of multiple mediating factors, and that the reminding stressors variable is a mediator candidate, albeit not both a necessary and a sufficient candidate for an effect to occur.

Hypothesis $2C_4$: There will be a mediating effect of perceived stress on the relationship between obtaining stressors and medication adherence.

Three sets of regression equations were used to test for the mediating effect of perceived stress on the relationship between obtaining stressors and medication adherence. First, obtaining stressors (the independent variable) had an effect on perceived stress (the mediator variable) in the first set of regression equations (using raw scores beta=.310, p<.001; using deviation scores beta=.156, p<.001). Second, obtaining stressors (the independent variable) had an effect on the dependent variable (medication adherence) in the second set of equations (using raw scores beta=-.172, p<.001; using deviation scores beta=.098, p=.003). And, in the third set of regression equations perceived stress (the mediator variable) had an effect on medication adherence (the dependent variable) (using raw scores beta=-.263, p<.001; using deviation scores beta=.118, p<.001). Since all these regressions held in the predicted direction, the effect of obtaining stressors (the independent variable) on medication adherence (the dependent variable) had to be found less in the third set of equations (using raw scores beta=.095, p=.004; using deviation scores beta=.076,

Figure 5.4 Path diagram using multiple regression with raw scores (r) and deviation scores (d) for testing the effects of perceived stress on the relationship between obtaining stressors and medication adherence



p=.021) than in the second equation (using raw scores beta=-.172, p<.001; using deviation scores beta=.098, p=.003). Perfect mediation would have held if obtaining stressors (the independent variable) had no effect when perceived stress (the mediator) was controlled in this manner. Since the residual path is not zero, this indicates the operation of multiple mediating factors, and that the obtaining stressors variable is a mediator candidate, albeit not both a necessary and a sufficient candidate for an effect to occur.

Third set of hypotheses

The third set of hypotheses revolve around the prediction that type of doctor support will moderate two types of relationships: 1.) the relationships between type of stressors and perceived stress, and 2.) the relationship between perceived stress and medication adherence. To begin this set of hypotheses, the zero order correlations will be examined (Table 5.29) for associations between the endogenous variables. Then, beta coefficients will be examined (Table 5.30) for associations between the exogenous and endogenous variables of concern. Finally, beta coefficients will be examined using untransformed (raw) scores and transformed (deviation) scores for significant interactions between type of stressor and type of doctor support.

Hypothesis $3A_1$: There will be negative main effect between advising stressors and doctor consultation support, a positive main effect between advising stressors and perceived stress, and negative main effect between doctor consultation support and perceived stress.

A negative correlation (r=-.223, p<.001) was found between advising stressors and doctor consultation support (Table 5.29). The correlation between advising stressors and perceived stress (r=.632, p<.001) was positive (Table 5.27). Doctor consultation support was negatively associated with perceived medication stress (r=-.150, p<.001).

Table 5.29 Correlations between Type of Support and Subject's Age, Income, Health Status, Medication Adherence, Type of Stressors, and Perceived Stress

			Health Status				Stressors				
	Age	Income	Self rated	CDS	Med Adherence	# Meds	Advising	Isolating	Reminding	Obtaining	Perceived Stress
Doctor Support											
Consultation	.054	.000	.009	.016	.096**	.061	-.223**	-.318**	-.125**	-.079*	-.150**
Affirmation	.076*	-.059	-.031	.028	.076*	.040	-.200**	-.296**	-.057	-.093**	-.121**
Actuation	.108**	-.051	-.011	.053	.080*	.061	-.206**	-.259**	-.067*	-.046	-.136**
Acquisition	.048	.058	.057	-.008	.112**	-.008	-.278**	-.320**	-.124**	-.131**	-.216**
Pharmacist Support											
Consultation	-.025	-.080*	.029	.078*	.048	.073*	-.166**	-.251**	-.055	-.090**	-.091**
Affirmation	-.008	-.072*	-.010	.084**	.043	.071*	-.140**	-.207**	-.024	-.071*	-.060
Actuation	.013	-.121**	-.003	.089**	.030	.065*	-.145**	-.189**	-.023	-.058	-.051
Acquisition	-.010	-.071*	.008	.087**	.051	.061	-.185**	-.201**	-.026	-.079*	-.089**
Other Person Support											
Consultation	.121**	-.177**	-.190**	.098**	-.002	.137**	-.016	-.021	.109**	.086**	.055
Affirmation	.107**	-.135**	-.161**	.081*	.032	.135**	-.068*	-.022	.088**	.080*	.042
Actuation	.065*	-.107**	-.150**	.097**	-.062	.119**	.020	-.038	.184**	.075*	.101**
Acquisition	.082*	-.121**	-.196**	.149**	-.004	.167**	-.008	-.031	.093**	.094**	.050

Hypothesis $3A_2$. There will be negative main effect between isolating stressors and doctor affirmation support, a positive main effect between isolating stressors and perceived stress, and a negative main effect between doctor affirmation support and perceived stress.

A negative correlation (r=-.296, p<.001) was found between isolating stressors and doctor affirmation support (Table 5.29). The correlation between isolating stressors and perceived stress (r=.454, p<.001) was positive (Table 5.27). Doctor affirmation support was negatively associated with perceived medication stress (r=-.121, p<.001).

Hypothesis $3A_3$: There will be negative main effect between reminding stressors and doctor actuation support, a positive main effect between reminding stressors and perceived stress, and a negative main effect between doctor actuation support and perceived stress.

A negative correlation (r=-.067, p<.043) was found between reminding stressors and doctor actuation support (Table 5.29). The correlation between reminding stressors and perceived stress (r=.489, p<.001) was positive (Table 5.27). Doctor actuation support was negatively associated with perceived medication stress (r=-.136, p<.001).

Hypothesis $3A_4$: There will be negative main effect between obtaining stressors and doctor acquisition support, a positive main effect between obtaining stressors and perceived stress, and a negative main effect between doctor acquisition support and perceived stress.

A negative correlation (r=-.131, p<.001) was found between obtaining stressors and doctor acquisition support (Table 5.29). The correlation between obtaining stressors and perceived stress (r=.310, p<.001) was positive (Table 5.27). Doctor acquisition support was negatively associated with perceived medication stress (r=-.216, p<.001).

Hypothesis $3A_5$: There will be negative main effect between perceived stress and doctor affirmation support, a negative main effect between perceived stress and medication adherence, and a positive main effect between doctor affirmation support and medication adherence.

A negative correlation (r=-.121, p<.001) exists between perceived stress and doctor affirmation support (Table 5.29). The correlation between perceived stress and medication adherence (r=-

Table 5.30 Multiple Regression Analysis of Elderly Outpatient's Age, Income, Self-rated Health Status and Chronic Disease Score on Doctor Consultation Support, Doctor Affirmation Support, Doctor Actuation Support, and Doctor Acquisition Support using Raw Scores

Sociodemographic Variables	Beta(significance)			
	Doctor Support			
	Consultation	Affirmation	Actuation	Acquisition
Age	.052(.127)	.072(.034)	.106(.002)	.056(.098)
Income	-.003(.939)	-.056(.102)	-.052(.132)	.050(.149)
Self-rated Health	.033(.363)	.001(.978)	.031(.388)	.077(.031)
Chronic Disease Score	.029(.408)	.031(.375)	.069(.051)	.012(.735)
R^2 of model	.004	.010	.018	.012
F of model	.897	2.071	3.939	2.694
p-value of model	.465	.083	.004	.030

.295, $p<.001$) was negative (Table 5.27). Doctor affirmation support was positively associated with medication adherence ($r=.076$, $p<.018$).

Hypothesis 3B The associations between the exogenous variables and doctor medication-specific social support variables found earlier using zero order correlations may no longer be significant when using multiple regressions.

When comparing the results on Table 5.29 against the results on Table 5.30, it becomes clear that age remains positively associated with doctor affirmation support ($r=.076$, $p=.017$; beta=.072, $p=.034$), and doctor actuation support ($r=.108$, $p=.001$; beta=.106, $p=.002$). The associations between other exogenous variables and other types of doctor medication-specific social support remain nonsignificant.

To test for the moderating effects of type of doctor support, a series of hierarchical multiple regression analyses were conducted using deviation (transformed) scores and raw (untransformed) scores. A moderating effect requires that type of doctor support interacts with type of stressors to modify perceived stress, or that doctor affirmation support interacts with perceived stress to modify medication adherence. If the F ratio for the interaction term is significant, then the moderating model is supported.

The moderating hypotheses of interaction effects specifies that type of stressors relates to perceived stress differently depending on the level of type of doctor support, or that perceived stress relates to medication adherence differently depending on the level of doctor affirmation support. These effects will be charted with each set of multiple regressions. However, the significance of the interaction (the slope) cannot be determined without looking at the results of the product-term regression using deviation scores. The test of this moderating effect is achieved by the following multiplicative regression models:

$$Y= b_0 + b_1X + b_2Z + b_3XZ + e$$

where Y = perceived stress, X = type of stressors, Z = type of Doctor support, and e = error term and, where Y = medication adherence, X = perceived stress, Z = Doctor affirmation support, and *e* = error term.

Using deviation scores in product-term regression has been recommended as a cure for the multicollinearity problem (high correlation between the product-term and one or more of its constituents) that often arises with the use of untransformed scores (e.g., Finney, Mitchell, Cronkite & Moos, 1984). Although deviation scores will reduce the product-term's correlation with the constituent variables, multicollinearity poses no threat to the analysis of interaction or main effects unless the correlation is so high as to produce rounding errors in computer calculations (e.g., Cronbach and Snow, 1977).

Type of doctor support was expected to operate as a moderating (buffer) variable to perceived stress at high levels of type of stressors. And, doctor affirmation support was expected to operate as a moderating (buffer) variable to medication adherence at high levels of perceived stress. In order to test these hypotheses, a multiple regression equation was generated for each hypothesis. For example, for those hypotheses requiring a test of whether type of doctor support was a moderator of type of stressors, the SPSS forced entry procedure suggested by Baron and Kenny (1986) was employed in a stepwise fashion. First, type of stressors and type of doctor support were entered in two separate blocks. Then the interaction term was entered on the third step.

Hypothesis $3C_1$: There will be a moderating effect of doctor consultation support on the relationship between advising stressors and perceived stress.

As shown in Table 5.31, the interaction term (advising stressors X doctor consultation support) did contribute to the prediction of perceived stress (F-ratio of R^2 Change = 6.202, p=.013). This suggests that doctor consultation support moderates the relationship between advising stressors and

Table 5.31 Raw score and deviation score multiple regression analysis relating advising stressors, doctor consultation support, and Advising stressors-Doctor consultation support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Advising Stressors	.621	.386	.386	556.930(<.001)
Doctor Consultation Support	-.015	.386	.000	.326(.568)
Advising Stressors X Doctor Consultation Support	-.109	.387	.001	1.112(.292)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Advising Stressors	.374	.140	.140	144.090(.000)
Doctor Consultation Support	.038	.141	.001	1.439(.231)
Advising Stressors X Doctor Consultation Support	.157	.147	.006	6.202(.013)

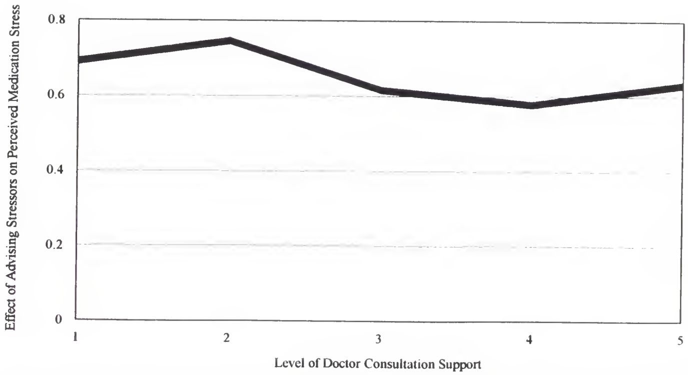


Figure 5.5 The Effect of Advising Stressors on Perceived Medication Stress for Different Levels of Doctor Consultation Support

Table 5.32 Raw Score and deviation score multiple regression analysis relating isolating stressors, Doctor affirmation support, and isolating stressors-Doctor affirmation support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Isolating Stressors	.463	.214	.214	245.821(<.001)
Doctor Affirmation Support	.019	.215	.001	.361(.548)
Isolating Stressors X Doctor Affirmation Support	.060	.215	.000	.492(.483)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Isolating Stressors	.239	.057	.057	54.655(.000)
Doctor Affirmation Support	-.008	.057	.000	.061(.805)
Isolating Stressors X Doctor Affirmation Support	.112	.060	.002	2.234(.135)

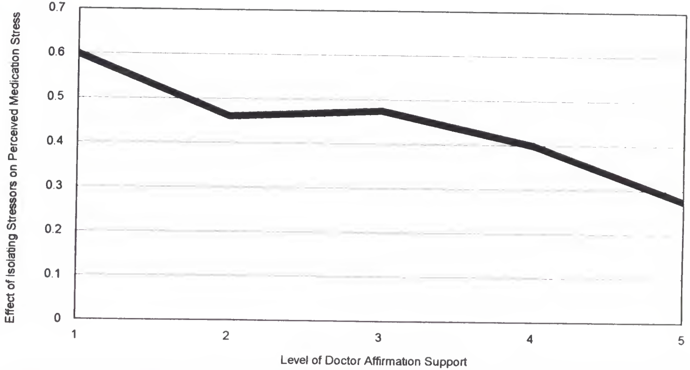


Figure 5.6 The Effect of Isolating Stressors on Perceived Medication Stress for Different Levels of Doctor Affirmation Support

perceived stress.

Hypothesis $3C_2$: There will be a moderating effect of doctor affirmation support on the relationship between isolating stressors and perceived stress.

The interaction term (isolating stressors X doctor affirmation support) did not contribute to the prediction of perceived stress (Table 5.32). This suggests that doctor affirmation support does not moderate the relationship between isolating stressors and perceived stress. In contrast, a zero order correlation was found earlier for Doctor affirmation support, accounting for a proportion of the variance in perceived stress.

Hypothesis $3C_3$: There will be a moderating effect of doctor actuation support on the relationship between reminding stressors and perceived stress.

As shown in Table 5.33, the interaction term (reminding stressors X doctor actuation support) did contribute to the prediction of perceived stress (F-ratio of R^2 Change = 10.605, p=.001). This suggests that doctor actuation support moderates the relationship between reminding stressors and perceived stress.

Hypothesis $3C_4$: There will be a moderating effect of doctor acquisition support on the relationship between obtaining stressors and perceived stress.

As shown in Table 5.34, the interaction term (obtaining stressors X doctor acquisition support) did contribute to the prediction of perceived stress (change in F = 4.158, p=.042). This suggests that doctor acquisition support moderates the relationship between obtaining stressors and perceived stress.

Hypothesis $3C_5$: There will be a moderating effect of doctor affirmation support on the relationship between perceived stress and medication adherence.

As shown in Table 5.35, the interaction term (perceived stress X doctor affirmation support) did not contribute to the prediction of medication adherence. This suggests that doctor affirmation support does not moderate the relationship between perceived stress and medication adherence. In

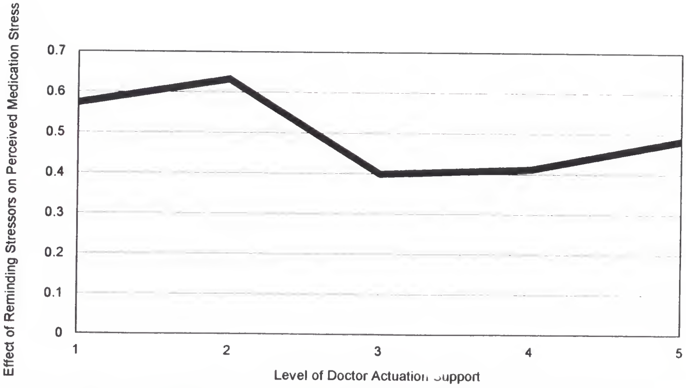


Figure 5.7 The Effect of Reminding Stressors on Perceived Medication Stress for Different Levels of Doctor Actuation Support

Table 5 34 Raw score and deviation score multiple regression analysis relating obtaining stressors, doctor acquisition support, and obtaining stressors-doctor acquisition support interaction to perceived medication stress

Using Raw Scores.

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Obtaining Stressors	.307	.094	.094	95.470(<.001)
Doctor Acquisition Support	-.181	.126	.032	33.808(<.001)
Obtaining Stressors X Doctor Acquisition Support	-.050	.126	.000	.163(.687)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Obtaining Stressors	.159	.025	.025	23.836(.000)
Doctor Acquisition Support	.088	.033	.008	7.259(.007)
Obtaining Stressors X Doctor Acquisition Support	.127	.037	.004	4.158(.042)

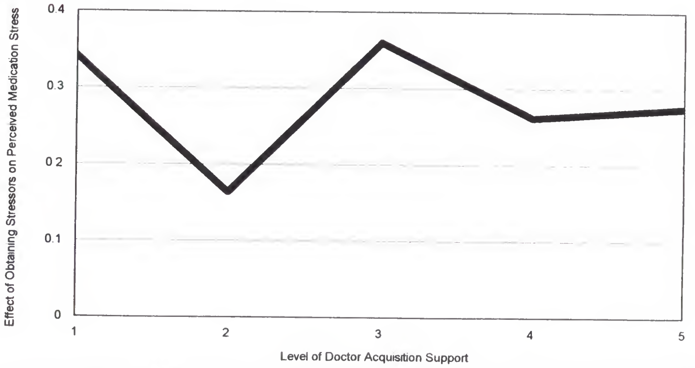


Figure 5.8 The Effect of Obtaining Stressors on Perceived Medication Stress for Different Levels of Doctor Acquisition Support

Table 5.35 Raw score and deviation score multiple regression analysis relating perceived stress, doctor affirmation support, and perceived stress-doctor affirmation support interaction to medication adherence using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Perceived Stress	-.290	.084	.084	85.585(<.001)
Doctor Affirmation Support	.042	.086	.002	1.75 (.186)
Perceived Stress X Doctor Affirmation Support	.009	.086	.000	.010(.919)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Perceived Stress	.133	.018	.018	16.731(.000)
Doctor Affirmation Support	-.048	.020	.002	2.145(.143)
Perceived Stress X Doctor Affirmation Support	-.041	.020	.000	.293(.589)

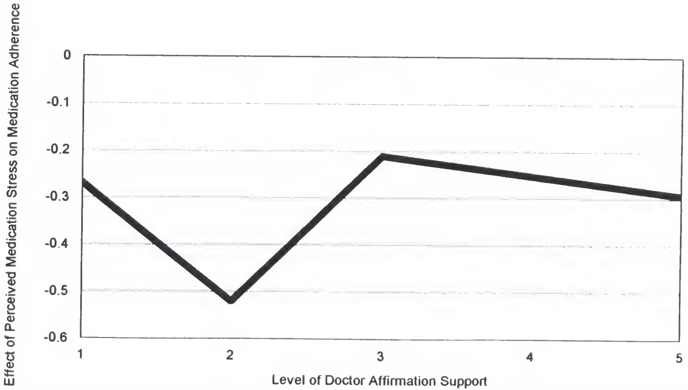


Figure 5.9 The Effect of Perceived Medication Stress on Medication Adherence for Different Levels of Doctor Affirmation Support

contrast, a zero order correlation was found earlier for doctor affirmation support, accounting for a proportion of the variance in medication adherence.

Fourth set of hypotheses

This set of hypotheses are similar to those for doctor support. To test for the moderating effects of type of pharmacist support rather than doctor support, the same analytic strategy will be employed, but this time the pharmacist support variables will be used instead of doctor support variables.

Hypothesis $4A_1$: There will be negative main effect between advising stressors and pharmacist consultation support, a positive main effect between advising stressors and perceived stress, and negative main effect between pharmacist consultation support and perceived stress.

A negative correlation ($r=-.166$, $p<.001$) was found between advising stressors and pharmacist consultation support (Table 5.29). The correlation between advising stressors and perceived stress ($r=.632$, $p<.001$) was positive (Table 5.27). Pharmacist consultation support was negatively associated with perceived stress ($r=-.091$, $p=.005$).

Hypothesis $4A_2$: There will be negative main effect between isolating stressors and pharmacist affirmation support, a positive main effect between isolating stressors and perceived stress, and a negative main effect between pharmacist affirmation support and perceived stress.

A negative correlation ($r=-.207$, $p<.001$) was found between isolating stressors and pharmacist affirmation support (Table 5.29). The correlation between isolating stressors and perceived stress ($r=.454$, $p<.001$) was positive (Table 5.27). Pharmacist affirmation support was not associated with perceived stress.

Hypothesis $4A_3$: There will be negative main effect between reminding stressors and pharmacist actuation support, a positive main effect between reminding stressors and perceived stress, and a negative main effect between pharmacist actuation support and perceived stress.

No association was found between reminding stressors and pharmacist actuation support (Table 5.29). The correlation between reminding stressors and perceived stress (r=.489, p<.001) was positive (Table 5.27). Pharmacist actuation support was not associated with perceived stress.

Hypothesis 4A_4: There will be negative main effect between obtaining stressors and pharmacist acquisition support, a positive main effect between obtaining stressors and perceived stress, and a negative main effect between pharmacist acquisition support and perceived stress.

A negative correlation (r=-.079, p=.015) was found between obtaining stressors and pharmacist acquisition support (Table 5.29). The correlation between obtaining stressors and perceived stress (r=.310, p<.001) was positive (Table 5.27). Pharmacist acquisition support was negatively associated with perceived stress (r=-.089, p=.006).

Hypothesis 4A_5: There will be negative main effect between perceived stress and pharmacist affirmation support, a negative main effect between perceived stress and medication adherence, and a positive main effect between pharmacist affirmation support and medication adherence.

No association was found between perceived stress and pharmacist affirmation support (Table 5.29). The correlation between perceived stress and medication adherence (r=-.295, p<.001) was negative (Table 5.27). Pharmacist affirmation support was not associated with medication adherence.

Hypothesis 4B: The associations between the exogenous variables and pharmacist medication-specific social support variables found earlier using zero order correlations may no longer be significant when using multiple regressions.

It is interesting to note that income and Chronic Disease Score were associated with each type of pharmacist medication-specific social support using both zero-order correlations (Table 5.29) and the multiple regressions (Table 5.36). Furthermore, an association between self-rated health and pharmacist consultation support that was not significant using zero-order correlations, was significant when using multiple regression (Table 5.36).

Hypothesis $4C_1$: There will be a moderating effect of pharmacist consultation support on the relationship between advising stressors and perceived stress.

As shown in Table 5.37, the interaction term (advising stressors X pharmacist consultation support) did contribute to the prediction of perceived stress (F-ratio of R^2 Change = 9.400, p=.002). This suggests that pharmacist consultation support moderates the relationship between advising stressors and perceived stress.

Hypothesis $4C_2$: There will be a moderating effect of pharmacist affirmation support on the relationship between isolating stressors and perceived stress.

The interaction term (isolating stressors X pharmacist affirmation support) did not contribute to the prediction of perceived stress (Table 5.38). This suggests that pharmacist affirmation support does not moderate the relationship between isolating stressors and perceived stress. In contrast, a zero order correlation was found earlier. Furthermore, a main effect was found earlier for pharmacist affirmation support (r=-.207, p<.001), accounting for a proportion of the variance in perceived stress.

Hypothesis $4C_3$: There will be a moderating effect of pharmacist actuation support on the relationship between reminding stressors and perceived stress.

The interaction term (reminding stressors X pharmacist actuation support) did not contribute to the prediction of perceived stress (Table 5.39). This suggests that pharmacist actuation support does not moderate the relationship between reminding stressors and perceived stress. Furthermore, no association was found earlier (Table 5.29) between reminding stressors and pharmacist actuation support, or between pharmacist actuation support and perceived stress.

Hypothesis $4C_4$: There will be a moderating effect of pharmacist acquisition support on the relationship between obtaining stressors and perceived stress.

Table 5.36 Multiple Regression Analysis of Elderly Outpatient's Age, Income, Self-rated Health Status and Chronic Disease Score on Pharmacist Consultation Support, Pharmacist Affirmation Support, Pharmacist Actuation Support, and Pharmacist Acquisition Support using Raw Scores

Variables	Beta(significance)			
	Pharmacist Support			
	Consultation	Affirmation	Actuation	Acquisition
Age	-.037(.274)	-.028(.416)	.005(.877)	.000(.992)
Income	-.095(.005)	-.082(.018)	-.129(<.001)	-.082(.017)
Self-rated Health	.088(.013)	.047(.189)	.052(.145)	.061(.086)
Chronic Disease Score	.115(.001)	.111(.002)	.117(.001)	.117(.001)
R^2 of model	.023	.017	.027	.018
F of model	4.962	3.758	5.961	3.989
p-value of model	.001	.005	.000	.003

Table 5.37 Raw score and deviation score multiple regression analysis relating advising stressors, pharmacist consultation support, and advising stressors-pharmacist consultation support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Advising Stressors	.628	.395	.395	579.168(<.001)
Pharmacist Consultation Support	-.002	.395	.000	.005(.945)
Advising Stressors X Pharmacist Consultation Support	-.097	.396	.001	1.229(.268)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Advising Stressors	.389	.152	.152	158.780(.000)
Pharmacist Consultation Support	-.019	.152	.000	.365(.546)
Advising Stressors X Pharmacist Consultation Support	.264	.161	.009	9.400(.002)

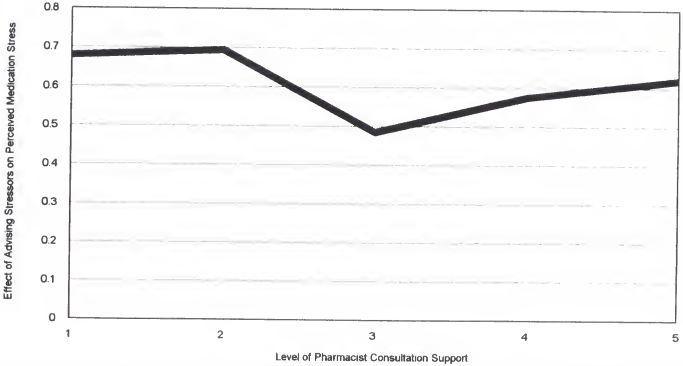


Figure 5.10 The Effect of Advising Stressors on Perceived Medication Stress for Different Levels of Pharmacist Consultation Support

Table 5.38 Raw score and deviation score multiple regression analysis relating isolating stressors, pharmacist affirmation support, and isolating stressors-pharmacist affirmation support interaction to perceived medication stress

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Isolating Stressors	.451	.203	.203	225.968(<.001)
Pharmacist Affirmation Support	.041	.205	.002	1.834(.176)
Isolating Stressors X Pharmacist Affirmation Support	.095	.206	.001	1.055(.305)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Isolating Stressors	.233	.054	.054	50.868(.000)
Pharmacist Affirmation Support	-.033	.055	.001	1.039(.308)
Isolating Stressors X Pharmacist Affirmation Support	.072	.056	.001	.572(.450)

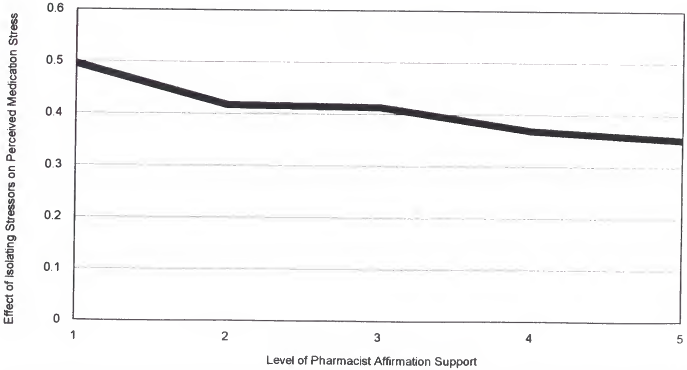


Figure 5 11 The Effect of Isolating Stressors on Perceived Medication Stress for Different Levels of Pharmacist Affirmation Support

Table 5.39 Raw score and deviation score multiple regression analysis relating reminding stressors, pharmacist actuation support, and reminding stressors-pharmacist actuation support interaction to perceived medication stress

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Reminding Stressors	.483	.233	.233	273.842(<.001)
Pharmacist Actuation Support	-.040	.235	.002	1.872(.172)
Reminding Stressors X Pharmacist Actuation Support	-.100	.235	.001	.956(.329)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Reminding Stressors	.280	.078	.078	76.681(.000)
Pharmacist Actuation Support	.013	.079	.000	.161(.688)
Reminding Stressors X Pharmacist Actuation Support	.027	.079	.000	.098(.754)

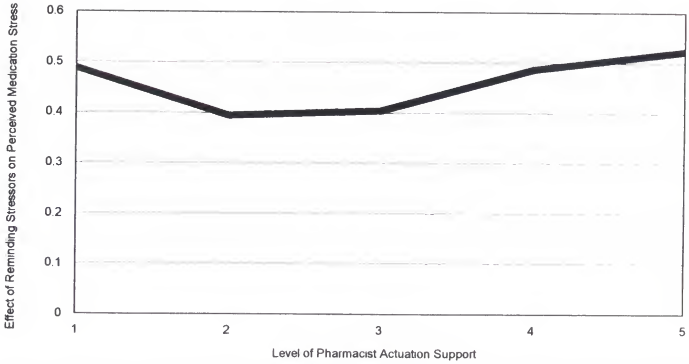


Figure 5.12 The Effect of Reminding Stressors on Perceived Medication Stress for Different Levels of Pharmacist Actuation Support

Table 5.40 Raw score and deviation score multiple regression analysis relating obtaining stressors, pharmacist acquisition support, and obtaining stressors-pharmacist acquisition support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Obtaining Stressors	.297	.088	.088	87.390(<.001)
Pharmacist Acquisition Support	-.069	.093	.005	4.663(.031)
Obtaining Stressors X Pharmacist Acquisition Support	.099	.093	.001	.844(.359)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Obtaining Stressors	.144	.021	.021	19.211(.000)
Pharmacist Acquisition Support	-.012	.021	.000	.125(.724)
Obtaining Stressors X Pharmacist Acquisition Support	.074	.022	.001	.637(.425)

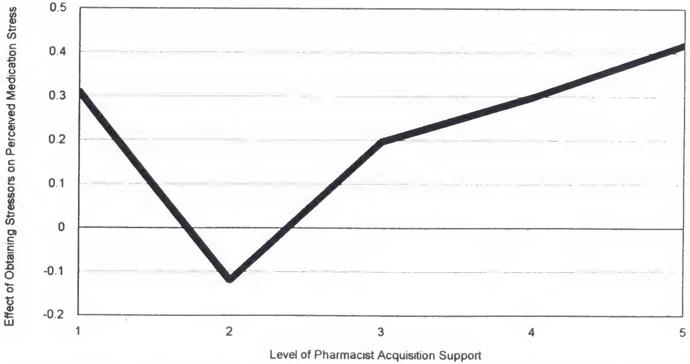


Figure 5.13 The Effect of Obtaining Stressors on Perceived Medication Stress for Different Levels of Pharmacist Acquisition Support

Table 5.41 Raw score and deviation score multiple regression analysis relating perceived stress, pharmacist affirmation support, and perceived stress-pharmacist affirmation support interaction to medication adherence

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Perceived Stress	-.292	.085	.085	85.133(<.001)
Pharmacist Affirmation Support	.026	.086	.001	.672(.413)
Perceived Stress X Pharmacist Affirmation Support	-.076	.087	.001	.983(.322)

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Perceived Stress	.136	.018	.018	17.207(.000)
Pharmacist Affirmation Support	-.045	.021	.002	1.884(.170)
Perceived Stress X Pharmacist Affirmation Support	-.069	.021	.001	.527(.468)

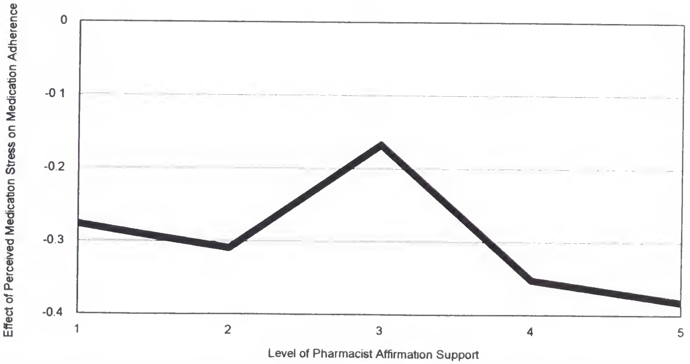


Figure 5.14 The Effect of Perceived Medication Stress on Medication Adherence for Different Levels of Pharmacist Affirmation Support

The interaction term (obtaining stressors X pharmacist acquisition support) did not contribute to the prediction of perceived stress (Table 5.40). This suggests that pharmacist acquisition support does not moderate the relationship between obtaining stressors and perceived stress. In contrast, an association was found earlier (Table 5.29) between obtaining stressors and pharmacist acquisition support (r=-.079, p=.015), and between pharmacist acquisition support and perceived stress (r=-.089, p=.006).

Hypothesis $4C_5$: There will be a moderating effect of other pharmacist affirmation support on the relationship between perceived stress and medication adherence.

The interaction term (perceived stress X pharmacist affirmation support) did not contribute to the prediction of medication adherence (Table 5.41). This suggests that pharmacist affirmation support does not moderate the relationship between perceived stress and medication adherence. Furthermore, no association was found earlier (Table 5.29) between perceived stress and pharmacist affirmation support, nor between pharmacist affirmation support and medication adherence.

Fifth set of hypotheses

This set of hypotheses are similar to those for doctor support. To test for the moderating effects of type of other person support rather than doctor support, the same analytic strategy will be employed, but this time the other person support variables will be used instead of doctor support variables.

Hypothesis $5A_1$: There will be a main effect between advising stressors and other person consultation support, a main effect between other person consultation support and perceived stress, and a positive main effect between advising stressors and perceived stress.

No association was found between advising stressors and other person's consultation support (Table 5.29). The correlation between advising stressors and perceived stress (r=.632, p<.001) was positive (Table 5.27). Other person consultation support was not associated with perceived stress.

Hypothesis 5A_2: There will be negative main effect between isolating stressors and other person's affirmation support, a positive main effect between isolating stressors and perceived stress, and a negative main effect between other person's affirmation support and perceived stress.

No association was found between isolating stressors and other person's affirmation support (Table 5.29). The correlation between isolating stressors and perceived stress ($r=.454$, $p<.001$) was positive (Table 5.27). Other person's affirmation support was not associated with perceived stress.

Hypothesis 5A_3: There will be negative main effect between reminding stressors and other person's actuation support, a positive main effect between reminding stressors and perceived stress, and a negative main effect between other person's actuation support and perceived stress.

A positive correlation ($r=.184$, $p<.001$) was found between reminding stressors and other person's actuation support (Table 5.29). The correlation between reminding stressors and perceived stress ($r=.489$, $p<.001$) was positive (Table 5.27). Other person's actuation support was positively associated with perceived stress ($r=.101$, $p=.002$).

Hypothesis 5A_4: There will be negative main effect between obtaining stressors and other person's acquisition support, a positive main effect between obtaining stressors and perceived stress, and a negative main effect between other person's acquisition support and perceived stress.

A positive correlation ($r=.094$, $p=.004$) was found between obtaining stressors and other person acquisition support (Table 5.29). The correlation between obtaining stressors and perceived stress was found earlier (Table 5.27) to be positive ($r=.310$, $p<.001$). Other person acquisition support was not associated with perceived stress.

Hypothesis 5A_5: There will be negative main effect between perceived stress and other person affirmation support, a negative main effect between perceived stress and medication adherence, and a positive main effect between other person affirmation support and medication adherence.

An association was not found between perceived stress and other person affirmation support (Table 5.29). The correlation between perceived stress and medication adherence ($r=-.295$, $p<.001$) was negative (see Table 5.27). Other person affirmation support was not associated with medication adherence.

Hypothesis 5B: The associations between the exogenous variables and (most concerned) other person medication-specific social support variables found earlier using zero-order correlations may no longer be significant when using multiple regressions.

It is interesting to note that every type of (most concerned) other person medication-specific social support was associated with every exogenous variable (age, income, self-rated health and Chronic Disease Score) using zero order correlations (see Table 5.29). These same associations were found using multiple regression with the exception of a nonsignificant association between other person affirmation medication-specific social support and (the more objective measure of health status) Chronic Disease Score (Table 5.42).

Hypothesis $5C_1$: There will be a moderating effect of other person consultation support on the relationship between advising stressors and perceived medication stress.

The interaction term (advising stressors X other person consultation support) did not contribute to the prediction of perceived stress (Table 5.43). This suggests that other person consultation support does not moderate the relationship between advising stressors and perceived stress. Furthermore, no main effects were found earlier (Table 5.29) between advising stressors and other person consultation support, nor were main effects found between other person consultation support and perceived stress.

Hypothesis $5C_2$: There will be a moderating effect of other person affirmation support on the relationship between isolating stressors and perceived medication stress.

Table 5.42 Multiple Regression Analysis of Elderly Outpatient's Age, Income, Self-rated Health Status and Chronic Disease Score on Other person Consultation Support, Other person Affirmation Support, Other person Actuation Support, and Other person Acquisition Support using Raw Scores

Sociodemographic Variables	Beta(significance)			
	Other person Support			
	Consultation	Affirmation	Actuation	Acquisition
Age	.128(<.001)	.115(.001)	.069(.040)	.103(.002)
Income	-.152(<.001)	-.114(.001)	-.089(.008)	-.097(.004)
Self-rated Health	-.139(.000)	.119(.001)	-.119(.001)	-.137(.000)
Chronic Disease Score	.077(.026)	.053(.132)	.073(.036)	.114(.001)
R^2 of model	.077	.051	.040	.064
F of model	17.868	11.421	8.926	14.538
p-value of model	.001	.000	.000	.000

Table 5.43 Raw score and deviation score multiple regression analysis relating advising stressors, other person consultation support, and advising stressors-other person consultation support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Advising Stressors	.629	.395	.395	575.207(<.001)
Other Person Consultation Support	.055	.398	.003	4.418(.036)
Advising Stressors X Other Person Consultation Support	-.035	.398	.000	.145(.704)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Advising Stressors	.390	.152	.152	157.410(.000)
Other Person Consultation Support	.003	.152	.000	.011(.918)
Advising Stressors X Other Person Consultation Support	-.039	.152	.000	.201(.654)

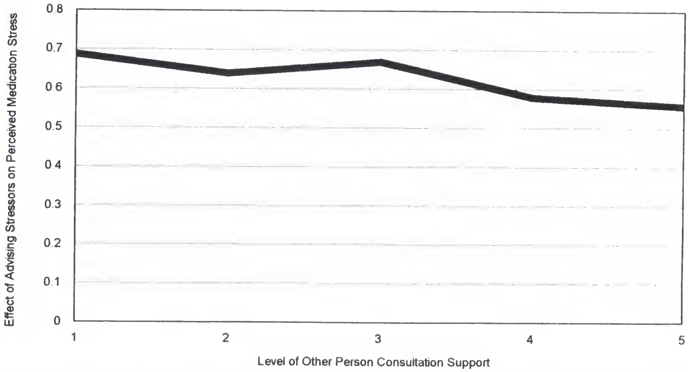


Figure 5.15 The Effect of Advising Stressors on Perceived Medication Stress for Different Levels of Other Person Consultation Support

Table 5.44 Raw score and deviation score multiple regression analysis relating isolating stressors, other person affirmation support, and isolating stressors-other person affirmation support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Isolating Stressors	.452	.204	.204	228.906(<.001)
Other Person Affirmation Support	.058	.208	.003	3.799(.052)
Isolating Stressors X Other Person Affirmation Support	-.228	.212	.005	5.355(.021)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Isolating Stressors	.234	.055	.055	51.712(.000)
Other Person Affirmation Support	.025	.055	.001	.606(.436)
Isolating Stressors X Other Person Affirmation Support	-.037	.056	.000	.197(.657)

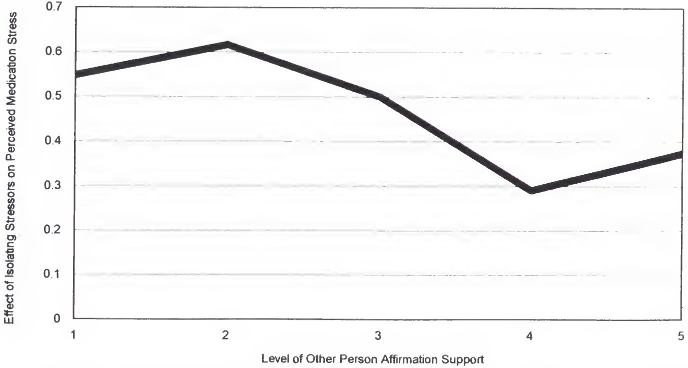


Figure 5.16 The Effect of Isolating Stressors on Perceived Medication Stress for Different Levels of Other Person Affirmation Support

The interaction term (isolating stressors X other person affirmation support) did not contribute to the prediction of perceived stress (Table 5.44). This suggests that other person affirmation support does not moderate the relationship between isolating stressors and perceived stress. Furthermore, a main effect was not found earlier (Table 5.29) between isolating stressors and other person affirmation support, nor was other person affirmation support associated with perceived stress.

Hypothesis 5C$_3$: There will be a moderating effect of other person actuation support on the relationship between reminding stressors and perceived stress.

The interaction term (reminding stressors X other person actuation support) did not contribute to the prediction of perceived stress (Table 5.45). This suggests that other person actuation support does not moderate the relationship between reminding stressors and perceived stress. In contrast, main effects were found earlier (Table 5.29) between reminding stressors and other person actuation support ($r=.184$, $p<.001$), and between other person actuation support and perceived stress ($r=.101$, $p=.002$).

Hypothesis 5C$_4$: There will be a moderating effect of other person acquisition support on the relationship between obtaining stressors and perceived stress.

The interaction term (obtaining stressors X other person acquisition support) did not contribute to the prediction of perceived stress (Table 5.46). This suggests that other person acquisition support does not moderate the relationship between obtaining stressors and perceived stress. Furthermore, a main effect was found earlier (Table 5.29) between obtaining stressors and other person acquisition support ($r=.094$, $p=.004$), but not between other person acquisition support and perceived stress.

Table 5.45 Raw score and deviation score multiple regression analysis relating reminding stressors, other person actuation support, and reminding stressors-other person actuation support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Reminding Stressors	.484	.234	.234	280.637(<.001)
Other Person Actuation Support	.007	.234	.000	.063(.802)
Reminding Stressors X Other Person Actuation Support	-.356	.241	.007	8.001(.005)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Reminding Stressors	.290	.084	.084	84.261(.000)
Other Person Actuation Support	.056	.087	.003	3.130(.077)
Reminding Stressors X Other Person Actuation Support	.053	.088	.000	.373(.542)

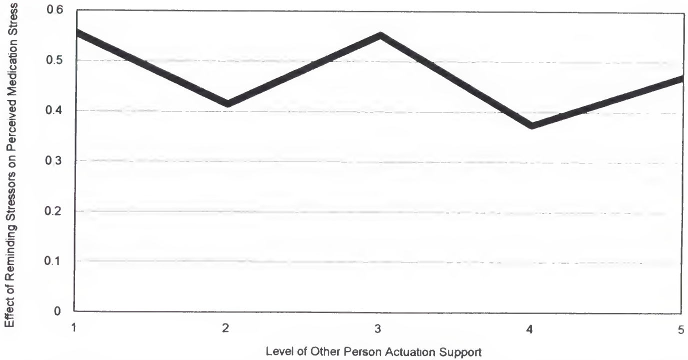


Figure 5.17 The Effect of Reminding Stressors on Perceived Medication Stress for Different Levels of Other Person Actuation Support

Table 5.46 Raw score and deviation score multiple regression analysis relating obtaining stressors, other person acquisition support, and obtaining stressors-other person acquisition support interaction to perceived medication stress using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Obtaining Stressors	.311	.097	.097	96.913(<.001)
Other Person Acquisition Support	.025	.097	.001	.603(.438)
Obtaining Stressors X Other Person Acquisition Support	-.074	.098	.000	.385(.535)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Obtaining Stressors	.158	.025	.025	23.081(.000)
Other Person Acquisition Support	.039	.026	.002	1.433(.232)
Obtaining Stressors X Other Person Acquisition Support	.057	.027	.001	.471(.493)

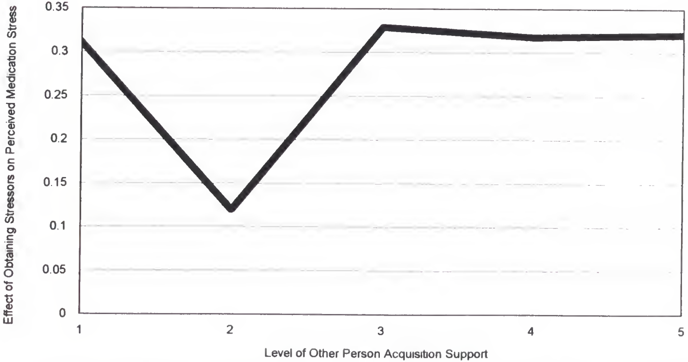


Figure 5.18 The Effect of Obtaining Stressors on Perceived Medication Stress for Different Levels of Other Person Acquisition Support

Table 5.47 Raw score and deviation score multiple regression analysis relating perceived stress, other person affirmation support, and perceived stress-other person affirmation support interaction to medication adherence using raw scores and deviation scores

Using Raw Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Perceived Stress	-.294	.086	.086	86.918(<.001)
Other Person Affirmation Support	.038	.088	.001	1.455(.228)
Perceived Stress X Other Person Affirmation Support	-.011	.088	.000	.017(.897)

Using Deviation Scores:

Predictor	Beta	R^2	Change R^2	F-ratio of R^2 Change(Sig.)
Perceived Stress	.134	.018	.018	16.780(.000)
Other Person Affirmation Support	-.026	.019	.001	.619(.432)
Perceived Stress X Other Person Affirmation Support	.058	.019	.000	.430(.512)

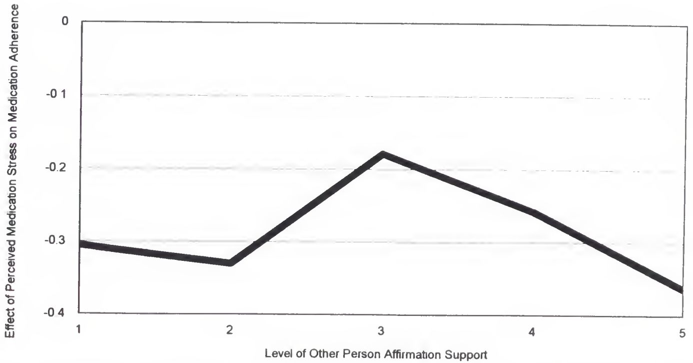


Figure 5.19 The Effect of Perceived Medication Stress on Medication Adherence for Different Levels of Other Person Affirmation Support

Hypothesis $5C_5$. There will be a moderating effect of other person affirmation support on the relationship between perceived stress and medication adherence.

The interaction term (perceived stress X other person affirmation support) did not contribute to the prediction of medication adherence (Table 5.47). This suggests that other person affirmation support does not moderate the relationship between perceived stress and medication adherence. Furthermore, no main effects were found earlier (Table 5.29) between perceived stress and other person affirmation support, nor between other person affirmation support and medication adherence.

Discussion of Results

The discussion to follow will focus on the results of the study and how they help to validate the proposed Stress Model of Medication Adherence among elderly outpatients. This section will be divided into three subsections. The first subsection will examine the relationships among stressors, perceived stress, and medication adherence. Then, the second subsection will examine the mediating effects of perceived stress. Finally, the third subsection will address the moderating effects of medication-specific social support.

Relationships Among Stressors, Perceived Stress, and Medication Adherence

A positive association was demonstrated between the objective medication-related stressor scale (number of prescriptions) and each subscale of the subjective medication-related stressors scale (see Table 5.27). The strongest positive correlation was between number of prescriptions and advising stressors (r=.211). As the number of prescriptions rise, the number of drug interactions increase, the complexity of the medication regimen increases, and consequently more information is required by a subject. Furthermore, the weakest positive correlation was between the objective medication-related stressor scale (number of prescriptions) and isolating stressors (r=.075). How often a subject experiences an inability to communicate his or her concerns about medication taking may not depend on how many prescriptions are being taken but more on the interpersonal relationships between the patient and his or her doctor, the patient and his or her pharmacist, and the patient and his or her (most concerned) other person.

There were positive associations found between all types of medication-related stressors and perceived medication stress (see Table 5.27). This suggests that as subjects experience more medication-related stressors, the subjects evaluate these experiences and generate higher levels of perceived medication stress. In the main study, each medication-related stressor item belonged to one of four domains: 1.) advising, 2.) reminding, 3.) isolating, and 4.) obtaining. Perceived medication stress was most strongly associated with advising stressors (r=.632), then reminding stressors (r=.489), followed by isolating stressors (r=.454), and finally obtaining stressors (r=.310).

These findings seem to suggest that experiences with certain types of stressors generate a higher level of perceived stress than the other medication-related stressors. No past studies have demonstrated clear links between these types of stressors and perceived stress. There are only studies that demonstrate that elderly patients do experience these different types of stressors. Elderly patients have to deal with a myriad of advising stressors associated with altered pharmacokinetic and pharmacodynamic effects of drugs (Hoffler, 1981; Braverman, 1982; Roberts and Turner, 1988; Dawling and Crome, 1989; Fox and Auestad, 1990; Taylor, 1990). There may also be changes in the absorption of orally administered drugs, body composition, serum albumin and globulin concentration, cardiac output and hepatic metabolism, renal blood flow, renal function and homeostatic mechanisms (Shaw, 1982; Chapron, 1995). Elderly patients also must struggle with a number of disease changes that occur with aging (Salzman, 1982; Tuck, 1988; Furberg and

Black, 1988). And, elderly patients have been found to need things to remind them to take their medications on time (Carswell, 1985; Fingeret and Schuettenberg, 1991; Rivers, 1992; Mackowiak et al., 1994; Spiers and Kutzik, 1995). Furthermore, elderly patients seem to need to communicate with spouses (Doherty et al., 1983), home helpers (Gilmore, Temple, and Taggart, 1989), and health care professionals (Wolf et al., 1989) about their medications or to get help in obtaining or taking their medications (Chang et al., 1985).

These more specific findings seem to agree with more general studies of the association between stressors and perceived stress described earlier in the literature review. Cohen, Karmack, and Mermelstein (1983) designed a 14-item Perceived Stress Scale (PSS) to measure the degree to which situation in one's life are appraised as stressful. The summated score on this scale was positively associated with stressors (life-event scores). A similar but larger scale with 30-items, called Perceived Stress Questionnaire (Levenstein et al., 1993), was also positively associated with stressors (stressful life events).

A negative association was found between perceived medication stress and medication adherence (r=-.295). This suggests that if subjects evaluate their stressor experiences and generate high levels of perceived medication stress, the same subjects will not adhere to their medication taking behavior. Some past studies have suggested a link between perceived medication stress and medication adherence. Cohen, Kamarck, and Mermelstein (1983) demonstrated a negative association between their Perceived Stress Scale and smoking-reduction maintenance. Frenzel et al. (1988) did not find an association between perceived stress and adherence in a study using this same Perceived Stress Scale and a measure of adherence to insulin injections. However, they did find a positive association between the measure of perceived stress and adherence to caloric diet intake. One could reasonably argue that this general perceived stress scale was more specific to medication administration (rather than to caloric intake), they would have found a significant correlation between perceived stress and insulin injections.

This negative relationship between perceived stress and medication adherence has been demonstrated in two recent studies. Polonsky et al. (1995) demonstrated a negative association between a 20-item measure of diabetes-related distress and adherence to self-care behaviors (which included the use of insulin). And, a negative association was found between a previously validated 12-item measure of psychological distress and medication adherence (Coons et al., 1994).

As hypothesized, there were negative associations found between all types of stressors and medication adherence. This suggests that as subjects experience more stressors, they report poorer medication adherence, i.e., that they are careless at times about taking their medications, they do forget to take their medicine, they have missed a dose of medication in the last 24 hours, and that when they feel better they sometimes stop taking their medicine.

Advising stressors were the type of stressors most strongly associated with medication nonadherence. This negative association suggests that as subjects experience more difficulties with what they have been told or not been told about their medication the same subjects will report a lower level of medication adherence behavior. This seems understandable concerning elderly patients. For example, Dall (1989) has stated that as elderly patients suffer from increased comorbidities as part of the aging process, unexpected side effects that they have not been informed about seem to increase and medication adherence seems to decrease.

Although this study can't tell the difference between the informed and uninformed subjects, there are studies that loosely agree with this association between advising stressors and medication adherence. When subjects are uninformed about the name and purpose of drugs, the dosage schedules, and the duration of the regimen and its possible side effects, or adverse consequences, this ignorance seems to predispose patients to medication nonadherence (Schwartz et al., 1962; Lundin et al., 1980; Klein et al., 1992). Studies indicate that physicians' drug instructions are given hastily at the end of patients' visits and are usually fragmentary and general. Furthermore, patients are not given basic information, such as the purpose of the drug, expected treatment outcomes, duration of the drug regimen, and dosage, schedule, and frequency (Svarstad, 1986). Sometimes patients receive no instructions at all, primarily because the physician assumes other health professionals have done so.

Reminding stressors were the next most strongly and negatively associated type of stressors with medication adherence. This suggests that as a subject experiences more difficulties maintaining their medication schedule, the same subjects will report a lower level of medication adherence behavior.

At least one study appears to agree with this finding and suggests that people frequently miss doses because of mistakes that occur when a well-established pattern of daily activities is changed either unexpectantly or by planning (Lorish, Richards, and Brown, 1989). In this study, 200 patients with rheumatoid arthritis typically explained that these changes directed their attention to another activity and-or they would be removed from their normal environment that contained cues to remind them to take the forgotten doses. The focus of attention upon other activities and-or the absence of reminder cues in the patient's immediate environment also accounted for missed doses because of being in too much of a hurry to do something or go somewhere, as well as being too absorbed or mentally focused on another activity. Patients who relied on their pain to remind them were also subject to missing doses. Patients who did not miss for these reasons learned to plan reminders and-or place extra supplies in appropriate places, so that a missed dose might be taken a little later.

Isolating stressors were the next most strongly associated type of stressors with medication adherence. This negative association suggests that as a subject experience more difficulties communicating their emotions related to their medication taking the same subjects report a lower level of medication adherence behavior.

Studies have demonstrated an association between isolation and medication adherence. Patients can freely communicate with hospital staff about their emotions related to their medication taking while hospitalized. The diabetic can talk to a nurse about his insulin injections. And, the asthmatic can talk to his doctor about how he wakes up in the middle of the night out of breath and looking for his inhaler. Patients who are fully adherent during their hospitalization may become medication nonadherent soon after discharge, in part because patients' drug therapy is closely supervised in the hospital and at initial diagnosis but is not monitored as carefully therafter when they go home and are not cared for in the same manner (Hare and Willcox, 1967; Irwin, Weitzell. and Morgan, 1971). Medication adherence tends to be a greater problem when patients are socially isolated in their own homes and cannot communicate these feelings (Haynes, Sackett, and Taylor, 1980).

Obtaining (or mechanical) stressors were the most weakly associated type of stressors with perceived medication stress. An attenuation of the strength of the correlation between obtaining stressors and perceived medication stress may be due to the low reliability of the subscale as measured with Cronbach's alpha. This negative association suggests that as subjects experience more problems physically getting and taking a medication, the same subjects report a lower level of medication adherence behaviors. At least one study has demonstrated an association between these obtaining (or mechanical) stressors and medication adherence. For example, it has been demonstrated that a major reason for one or more missed doses was running out of medicine and not being able to obtain a refill in time (Lorish, Richards, and Brown, 1989).

Two more general studies have examined the direct effect of stressors on adherence and seem to dovetail with the findings in this study on medication-related stressors. Each of these will be discussed in turn. Hanson and Pichert (1986) found a significant negative correlation between negative events and adherence in a study using a very general measure for negative events and adherence to a diabetic diet. They did not find any association between a measure for positive events and adherence to a diabetic diet. This would seem to loosely agree with the findings here based on negative experiences with medication taking and adherence to medications. Whether or not positive experiences with medication taking have an association with medication adherence will have to be addressed in a future study.

Frenzel et al. (1988) did not find a significant negative correlation between general stressors using the Daily Hassles Scale (Kanner, Coyne, Schaefer, and Lazarus, 1981) and a measure of adherence to insulin injections. However, they did find a significant negative correlation between this measure of stressors and adherence to caloric diet intake. One could reasonably argue that the general stressors scale they used was more specific to caloric intake than insulin injections, and that if the researchers used a stressor scale more specific to medication administration, they would have found a significant correlation between stressors and insulin injections.

Mediating Effects of Perceived Stress

From a cognitive phenomenological perspective (Lazaraus and Folkman, 1984), variation in outcomes to objectively similar stressors suggests that people have different interpretations of, and reactions to, stressful experiences (DeLongis, Folkman, and Lazarus, 1988). A person's reaction to a stressor is thought to be influenced by subjective appraisal of the stressor. The process by which subjective appraisal of the same stressful experiences results in different appraisals across individuals is not well specified.

A study attempted to examine this phenomenon and found that there are individual differences in the ability of some subjects to deal with what would seem to be objectively similar situations (e.g., Haley, Levine, Brown, and Bartolucci, 1987). It seems plausible from the present study that perceived medication stress, which is designed to measure the degree to which one's situation in taking medications are appraised as stressful, mediates the relationships between some types of stressors and medication adherence. In other words, perceived medication stress represents some property of the individual that transforms some medication-related stressor experiences in some way in a person's head, which eventually has an effect on their medication adherence behavior differently than another individual.

The mediating effect of perceived medication stress on the relationship between advising, isolating, reminding and obtaining medication-related stressors and medication adherence was tested. If perfect mediation had been demonstrated, the experiences with these types of stressors would have all went into the generation of perceived medication stress, and that perceived medication stress had the effect on medication adherence. However, perfect mediation was not demonstrated. Therefore, the experiences with these types of medication-related stressors went only partially into the generation of perceived medication stress. In this instance, perceived medication stress is not both a necessary and a sufficient candidate for medication adherence. From an examination of the direct effects of advising, isolating, reminding and obtaining medication-related stressors, it has been demonstrated that these medication-related stressors also have direct effects on medication adherence.

Only one other study has been identified which has examined the mediating effects of perceived stress. In an investigation conducted by Hooker et al. (1992), it was hypothesized that two types of personality (neuroticism and optimism) would have direct effects, and indirect effects through perceived stress, on health outcomes. Results showed that neuroticism had significant direct effects on all of the health outcomes, and substantial indirect effects, through perceived stress, on mental health outcomes. Certainly neuroticism and the experience of medication-related stressors are not the same. However, they are both strong negative experiences which might share similar indirect pathways through perceived stress to health outcomes, or similar direct pathways to health outcomes.

Moderating Effects of Medication-specific Social Support

Four types of medication-specific social support from three helping individuals were hypothesized to moderate relationships between four kinds of medication-related stressors and perceived medication stress. Furthermore, one type of medication-specific social support (i.e., affirmation support) was hypothesized to also moderate the relationship between perceived medication stress and medication adherence.

As hypothesized, three types of medication-specific social support (i.e., consultation, actuation, and acquisition support) from the doctor did seem to moderate some of the relationship between certain kinds of medication-related stressors (i.e., advising, reminding, and obtaining stressors, respectively) and perceived medication stress. And, as hypothesized, one type of medication-specific social support (i.e., consultation support) from the pharmacist did seem to moderate some of the relationship between one kind of medication-related stressors (i.e., advising stressors) and perceived medication stress. This suggests that the doctor and pharmacist seem to make an assessment of each elderly patient's perceived medication stress level, and then attempts to match their level of a certain kind of support to help that elderly patient deal effectively with that certain type of stressor.

Contrary to what was hypothesized, some kinds of medication-specific social support offered from particular individuals did not seem to moderate the relationship between kinds of medication-related stressors and perceived medication stress. Affirmation support from the doctor, pharmacist, and (most concerned) other person did not seem to moderate the relationship between isolating stressors and perceived stress. Also, affirmation support from the doctor, pharmacist, and other person did not seem to moderate the relationship between perceived stress and medication adherence. In addition, neither actuation and acquisition support from either the pharmacist or other person seemed to moderate the relationship between reminding and obtaining stressors, respectively, and perceived medication stress. Finally, consultation support from the other person did not seem to moderate the relationship between advising stressors and perceived medication stress. This suggests that for these situations the helping individual does not need to make an assessment of the elderly patient's perceived medication stress level, and then attempt to match their level of a kind of support to help the elderly patient deal effectively with a certain type of stressor. Instead, it seems to suggest that the helping individual need only offer a threshold level of a kind support to help the patient deal with a type of stressor. To offer the elderly patient a higher level of a certain kind of support would not help bring the elderly patient's level of perceived stress down any. These unexpected results might be explained in three ways: 1.) the helping individual's kind of support really has no moderating effect on the hypothesized relationship for this sample, or 2.) there is a psychometric problem with the item for the helping individual's support, or 3.) a combination of the first two reasons.

The explanation for the results of each helping individual depend on the particular situation. Medication-specific social support given by the doctor, pharmacist, and (most concerned) other person to the elderly outpatient will be discussed in turn.

Doctor medication-specific social support

As hypothesized, consultation, actuation, and acquisition support from the doctor did seem to moderate some of the relationship between advising, reminding, and obtaining stressors, respectively, and perceived medication stress. This suggests that doctors seem to make an assessment of each elderly patient's perceived medication stress level, and then attempt to match their level of a particular type of support to help that patient deal effectively with a certain kind of stressor.

Contrary to what was hypothesized, doctor affirmation support did not seem to moderate the relationship between isolating stressors and perceived medication stress, or the relationship between perceived medication stress and medication adherence. An examination of the direct effects of doctor affirmation support on perceived stress and medication adherence helps to elucidate this relationship. First, doctor affirmation support was negatively associated with perceived stress, suggesting that when subjects rate their doctors high on helping them work through any worries or concerns related to their medications, the same subjects evaluate the experience of their medication-related stressors (perceived stress) as less stressful. Second, doctor affirmation support was positively associated with medication adherence, suggesting that when subjects rate their doctors high on helping them work through any worries or concerns related to their medications, the same subjects rate higher on their medication adherence behavior items. Since there were associations between the constructs in this situation as hypothesized, there appears to be validity to the assertion the doctor affirmation support does not moderate these relationships.

In another study, whether doctors made these patient assessments was examined. Rashid and his associates (1989) studied 250 patients attending consecutive appointments with five doctors (general practitioners). The investigators attempted to identify deficiencies within each appointment as rated by patients and doctors. The patients and doctors significantly disagreed about the doctors' ability to assess and put patients at ease, to offer explanations and advice on treatment, and to allow expression of emotional feelings and about the overall benefit that the patients gained from the appointment. In all cases of disagreement, the doctor had a more negative view of the appointment than the patient. The investigators suggested that giving structured questionnaires to both patients and doctors during appointments could be a useful teaching tool for established doctors or those in training to improve the quality and sensitivity of care they provide.

Pharmacist medication-specific social support

As hypothesized, consultation support from the pharmacist did seem to moderate some of the relationship between advising and perceived medication stress. Wolf and his associates (1989) found that pharmacist consultation activities specific to the needs of the elderly taking medications have been found to result in better medication adherence among elderly patients. For example, weekly pharmacist counseling sessions resulted in improvements in medication adherence among one subgroup of elderly patients. And, among elderly patients belonging to the other subgroup, their identification as nonadherers helped pharmacists reduce medical misjudgement when making changes to a nonadherer's prescribed medications.

Contrary to what was hypothesized, pharmacist actuation support did not seem to moderate the relationship between reminding stressors and perceived medication stress. An examination of the direct effects of pharmacist actuation support on perceived stress and medication adherence helps to elucidate this relationship. First, pharmacist actuation support was not associated with perceived stress. This suggests that there is no association between pharmacists' helping subjects get the things they need to take their medications the right way and subjects' evaluations of their experiences with medication-related stressors (perceived stress). Perhaps, as suggested earlier, pharmacists will need to take more time to help subjects establish cues in their daily activities that will prompt them to take their medications on time. Second, pharmacist actuation support was not associated with medication adherence. This lack of an association between the pharmacist actuation support item and medication adherence items was surprising given the results of studies in the literature review (e.g., Wolf et al., 1989). It seems reasonable to assume that this lack of association is due to the latter combination of reasons. As pharmacists shift from their focus on the product to a focus on patient care, the association between pharmacist actuation support and medication adherence will probably become a positive association. And, as the pharmacist actuation support items are generated and refined to reflect this focus, the association between pharmacist actuation support and medication adherence will probably become an even stronger positive association.

Contrary to what was hypothesized, pharmacist acquisition support did not seem to moderate the relationship between obtaining stressors and perceived medication stress. An examination of the direct effects of pharmacist acquisition support on perceived stress and medication adherence helps to elucidate this relationship. First, pharmacist acquisition support was negatively associated with perceived stress, although the association was a weak one. Second, pharmacist acquisition support was not associated with medication adherence. The lack of an association between pharmacist acquisition support and medication adherence seems surprising since it is pharmacists' job to help the subjects' obtain their medications. It seems reasonable to assume that this lack of association is due to the combination of reasons. Hopefully, the pharmacist will then demonstrate to the subjects that they not only provide the patient with a medication, but with the right medication as they do with the doctor . Perhaps, subjects presently see the role of the pharmacist as someone who fills their medication and then places it in the mail. They see pharmacist acquisition support as irrelevant to them, i.e., something that can be done through automation. Hopefully, the pharmacist will take more time to communicate with the subject (or caregiver) what the pharmacist does to monitor the subject's medication regimen for drug-drug interactions, and to help the doctor tailor the subjects medication regimen when warranted to assure that the subject gets the right medication. When this change in subjects' perception occurs and more pharmacist acquisition support items are generated to reflect these activities, pharmacist acquisition support and medication adherence will become a positive association.

Contrary to what was hypothesized, pharmacist affirmation support did not seem to moderate the relationship between isolating stressors and perceived medication stress, or the relationship between perceived medication stress and medication adherence. An examination of the direct effects of pharmacist affirmation support on perceived stress and medication adherence helps to elucidate this relationship. First, pharmacist affirmation support was not associated with perceived stress. This suggests that there is no association between pharmacists' helping work through any worries or concerns related to their medications and subjects' evaluations of their experiences with medication-related stressors (perceived stress). Perhaps, as suggested earlier, pharmacists will need to take more time to communicate with the elderly subjects about their emotional concerns related to medication-taking. Second, pharmacist affirmation support was not associated with medication adherence. It seems reasonable to assume that this lack of association is due more to the first reason. As pharmacist affirmation support items are generated and refined to reflect this time spent by pharmacists to communicate with the subject about their emotional concerns, the association between pharmacist affirmation support and medication adherence will become a positive association.

Other person medication-specific social support

Contrary to what was hypothesized, other person consultation support did not seem to moderate the relationship between advising stressors and perceived medication stress. An examination of the direct effects of other person consultation support on perceived stress and medication adherence helps to elucidate this relationship. First, other person consultation support was not associated with perceived stress. This suggests that there is no association between other persons' helping subjects become aware of things they didn't know about their medications and subjects' evaluations of their experiences with medication-related stressors (perceived stress). Perhaps, other person consultation support items should reflect an attempt by that person to contact a health professional on the subject's behalf for advice about medication-related stressors. Second, most concerned other person consultation support was also not associated with medication adherence. It also seems reasonable to assume that this lack of association is due to the latter combination of reasons. Maybe this other person (who is not a health professional) has nothing to say that can change how a subject will evaluate his or her experiences with medication-related stressors. It should also be noted that the other person consultation support item differed substantially from the item used for doctor consultation support and pharmacist consultation support. It may have been that the other person consultation support item "helped me become aware of things I didn't know about my medications" did not reflect the domain it was designed to measure.

Contrary to what was hypothesized, other person actuation support did not seem to moderate the relationship between reminding stressors and perceived medication stress. An examination of the direct effects of other person actuation support on perceived stress and medication adherence helps to elucidate this relationship. First, other person actuation support was not associated with perceived stress. This suggests that there is no association between other persons' attempts to help subjects' remember to take their medications and subjects' evaluations of their experiences with medication-related stressors (perceived stress). Perhaps, other persons will need to take more time to help subjects establish cues in their daily activities that will prompt them to take their medications on time. Second, other person actuation support was not associated with medication adherence. This lack of an association between other person actuation support and medication adherence items was surprising given the results of studies in the literature review on spousal support (Doherty et al., 1983), relatives or home helpers (Gilmore, Temple, and Taggart, 1989). It seems reasonable to assume that this lack of association is due to the first reason. The other person actuation support item "helped me remember things such as taking my medicines and refilling my prescriptions" seems suitable. Maybe the other person (who is not a health professional) does not know what he or she can say to change the way the subject remembers to take his or her medications. This seems to suggest that the pharmacist or doctor should spend time with the (most concerned) other person to carefully formulated ways to make the patient remember to take their medication.

Contrary to what was hypothesized, other person acquisition support did not seem to moderate the relationship between obtaining stressors and perceived medication stress. An examination of the direct effects of other person acquisition support on perceived stress and medication adherence helps to elucidate this relationship. First, other person acquisition support was not associated with perceived stress. This suggests that there is no association between other persons' helping get to the pharmacy and subjects' evaluations of their experiences with medication-related stressors (perceived stress). Perhaps, this other person acquisition support item will need to be revised. Second, other person acquisition support was not associated with medication adherence. It seems reasonable to assume that this lack of association is due to the second reason. The other person acquisition support item, "helps me get to the pharmacy," might be rephrased to reflect the real help the other person offers. For example, if the other person acquisition support item had read "helps me get my refill requests delivered in time," an association might have been found. Other items might be generated to more strongly reflect what the other person acquisition support really entails. For example, other other person acquisition support items might read "helps me find out why my medications were not delivered to me by calling the pharmacist," or "helps me get another prescription from my doctor when I need one."

Contrary to what was hypothesized, other person affirmation support did not seem to moderate the relationship between isolating stressors and perceived medication stress, or the relationship between perceived medication stress and medication adherence. An examination of the direct effects of other person affirmation support on perceived stress and medication adherence helps to elucidate this relationship. First, other person affirmation support was not associated with perceived stress. This suggests that there is no association between other persons' helping work through any worries or concerns related to their medications and subjects' evaluations of their experiences with medication-related stressors (perceived stress). Perhaps, other persons will need to take more time to communicate with the elderly subjects about their emotional concerns related to medication-taking. Second, other person affirmation support was not associated with medication adherence. This suggests that there is no association between other persons' helping subjects work through any worries related to their medications and subjects' medication adherence.

Summary

The results of this exploratory study seem to suggest that for this sample of elderly outpatients there may be as many as four types of medication-related stressors: 1.) advising, 2.) reminding, 3.) obtaining, and 4.) isolating. The results also suggest that perceived medication stress partially mediates the relationships between type of stressors and medication adherence.

The results of this study seem to be theoretically consistent with the proposed model, in that the associations between stressors and perceived stress, and the associations between perceived stress and adherence are fairly strong. However, the weakness of the associations between support and perceived stress and between support and adherence seem to suggest that the model needs refinement to reflect the impact of specific types of support by incorporating specific types of perceived stress and adherence behaviors. It may be that advising, reminding, obtaining, and isolating types of perceived stress, all need to be considered for inclusion into the model. And, it may be that an adherence scale will need to be considered with different dimensions to reflect advising adherence behavior, reminding adherence behavior, obtaining adherence behavior, and isolating adherence behavior. Finally, more specific support items will need to be formulated for the doctor, pharmacist, and other person to reflect each "persons" specific impact on the specific relationships between stressors and types of perceived medication stress and between types of perceived medication stress and types of adherence.

This has implications for practice, in that the doctor, pharmacist, and (most concerned) other person may need to learn a new set of skills to help the patient deal not only with the specific relationships between specific stressors and different types of perceived medication stress, but specific relationships between different types of perceived medication stress and different types of medication adherence behaviors.

The next chapter will discuss the limitations on the entire study, including a discussion on the limitations on the mediating and moderating effects. The discussion will continue with a discussion on the implications for pharmacy practice and future research and end with some preliminary conclusions.

CHAPTER 6
DISCUSSION

The chapter will deliberate on the major limitations of the study and the major implications of the study. The major limitations of the study are addressed in three sections: 1.) limitations on the entire study, 2.) limitations on mediating effects, and 3.) limitations on moderating effects. The major implications of the study are addressed in two sections: 1.) implications for future research, and 2.) implications for pharmacy practice. The chapter will end with the conclusions.

Limitations on the Entire Study

There are a number of limitations that apply to the entire study. These limitations are: 1.) the use of a cross-sectional design, 2.) the failure to assess test-retest reliability, 3.) response bias, 4.) floor and ceiling effects, 5.) generalizability, and 6.) attentuation of associations due to measures with low reliability. Each of these will be discussed in turn.

This study used a cross-sectional, restrospective design. It would have been better to have employed prospective analyses. For example, the correlations found in this study between support and medication adherence are amenable to three alternative causal interpretations. These correlations may reflect support causing changes in medication adherence, medication adherence causing changes in support level, or a third factor (e.g., age) causing changes in both support and medication adherence. When two-wave (Time 1 and Time 2) longitudinal data are available, the investigator should use Time 2 medication adherence as the dependent variable with Time 1 stressors and support as the independent variables and Time 1 medication adherence as a control variable. By focusing on changes in medication adherence that occur as a function of Time 1 stress and support, this methodology would help rule out the possibility that results are attributable to prexisting medication nonadherence causing subsequent stressors and decreases in support. The use of multiple regression analysis would also make it possible to control for third variables (e.g., age) that may be correlated with the independent variables and medication adherence

Test-retest reliability was not assessed for stability over a predetermined period of time. To assess this, the revised questionnaire should be administered on two occasions to the subjects. The correlations would be tested for stability on each of the scales comprising the questionnaire.

There were concerns about response bias. Subjects may have answered many of the items in the direction of some ideal or socially desirable response. And, if they gave a very positive global response to all the medication-specific social support items posed, this might explain a lack of variability in the support measures. This could be tested by asking the same set of subjects the same items on the questionnaire at two different times with two different sets of instructions. For example, at Time 1 the subjects could be given the basic instructions about the purpose of the questionnaire. At Time 2, more directed instructions would be given, that is, to ask the subject to fill out the questionnaire according to what the subject considers to be good or ideal circumstances. The results would be compared by calculating the average on each scale in the questionnaire for each of the two administrations and then looking for significant differences using a paired *t* test.

Despite receiving a follow-up postcard, some subjects failed to return their questionnaire. The investigator after having contacted five nonresponders in Phase I, believed that by strengthening the message to the veterans about having responses from all veterans (even those veterans taking few or many medications) the response rate would increase. It did increase from 44% to 69%. However, the investigator also contacted twenty nonresponders in Phase II, and ascertained that the nonreponders seemed to think that they had to have several "problems" to respond, or they were disabled and unable to fill out the questionnaire without help, or they were now living in the hospital. Despite efforts to maximize the response rate, it may not be possible to get an accurate picture of the outpatient elderly population by the use of mailed questionnaires. This problem of nonresponse bias has been demonstrated before for a similar elderly veteran population (Graveley and Oseasohn, 1991). The methodology used in this study may have to be augmented with the use of telephone calls and visits to the veterans' homes. This nonresponse bias may also have contributed to some lack of variability in the medication-specific social support scores and the inability to demonstrate some moderator effect, as these subjects may be among those who have little or no forms of medication-specific social support (who belong in the "lower tail" of the social support curve).

Because of the nonresponse bias problem, it would have been difficult to get an accurate picture of the floor and ceiling effects of the different types of stressors. Future studies will need to ascertain these effects, and determine how these effects might establish bounds on variance in perceived stress and medication adherence.

The subjects were veterans (mostly male) over 65 years of age. Although methods are available for over sampling females, it wasn't possible to attain a proper over sampling. Most of the patients were from lower incomes, living in rural areas of north-central Florida and southern Georgia. The results of the study will therefore be limited in generalizability to other elderly populations. Furthermore, vulnerable subpopulations of elderly patients taking medications need to be investigated that may have higher levels of stressors and perceived stress, for example, cancer (oncology) patients.

Finally, one of the biggest limitations to this study were the measures themselves. In addition to needing more social support items to adequately detail the dimensions, many of the measures suffer from low reliabilities as measured by Cronbach's alpha. The low reliability in many of the measures, especially medication adherence, may be responsible for an attentuation in strength of the associations between the measures. This may be addressed in a future study with the inclusion of carefully selected items for each measure (especially medication adherence).

Limitations on Mediating Effects

An important feature of the study was to examine the effects of different types of stressors on medication adherence behavior as mediated by a transformation process internal to the elderly outpatient (perceived medication stress). There are limitations on this study that have effects on the results. These are discussed in turn.

Again, there were problems concerning the low reliability with the obtaining stressors and medication adherence measures. The improvement of the subscale for obtaining stressors can occur with the addition of items with good item-to-total correlations and which improve the Cronbach's alpha. And, improvement of the medication adherence scale might occur with the use of a battery of self-report measures. However, the improvement of the medication adherence measurement might only occur with more expensive methods, for example, the use of electronic medication monitors such as the Medication Event Monitoring System (Cramer et al., 1995).

Because perceived stress has been described in the literature as an internal, psychological variable, it is likely to have been measured with error. The presence of measurement error in the mediator can produce an underestimate of the effect of the mediator and an overestimate of the effect of the independent variable on the dependent variable (Judd and Kenny, 1981).

An assumption was made by the investigator that perceived stress (the mediator) is not caused by medication nonadherence (the dependent variable). It may be that medication nonadherence causes perceived medication stress when statistically analyzing the relationships between types of stressors and medication adherence. Feedback effects like this one need to be estimated throughout the model using structural modeling procedures (Jöreskog and Sörbom, 1984). Perceived stress may be an important determinant of medication adherence behavior, but other factors are also known in the literature to be important. These other intervening factors could have significantly decreased the association between medication-related stressors and medication adherence. These factors include the subject's personal history, experiences with the relief of complaints or symptoms, familial and cultural influences, and other predisposing and enabling characteristics (Kohn and White, 1975).

Limitations on Moderating Effects

Another important feature of the study was the moderating effects of different types of support on the two relationships: 1.) between type of stressors and perceived stress, and 2.) between perceived stress and medication adherence. There are limitations on this study that have affected the results. These are discussed in turn.

As was discussed in the results chapter, there is a serious measurement problem involving the medication-specific social support items adapted from the work of Caplan et al (1980). There were too few items available for an adequate detailing of the possible dimensions (i.e., consultation, affirmation, actuation, and acquisition). The medication-specific social support measures from this study will have to be augmented with the use of other items which reflect the particular dimension of support. A subtle but important methodological issue derives from a possible overlap of the isolating stressors and affirmation medication-specific social support measures (Gore, 1981; Berkman, 1982; Thoits, 1982; Cohen and Willis, 1985). Most studies of this nature have measured stress with a checklist of negative life events. These measures typically include items about interpersonal discord (e.g., marital problems) and social exits (e.g., moving, divorce, family death). By definition, such events result in at least temporary loss of support resources. Hence, there might be some confounding of stress and support measurement because the stress and support measures might to some extent, be measuring the same thing, namely changes in social relationships. Therefore, the process of formulating or revising isolating stressor items will require the careful construction and testing of more affirmation medication-specific social support items, while at the same time attempting to diminish the overlapping to avoid any potential confounding of these variables.

Only a small number of interactions specified in the hypotheses were tested in this study. A multitude of other two-way and possibly three-way interactions could and should be explored. For example, it is possible that the doctor and pharmacist consultation support items could have an interaction with the advising stressors to improve medication adherence. It seems plausible that if a doctor provides advice about a medication, and a pharmacist voices the same advice to the subject, this may help the subject evaluate experiences with advising stressors as less stressful.

The study only used affirmation medication-specific social support as a moderator between perceived medication stress and medication adherence. It may be that the other types of support moderate this relationship. It could be that another type of support from the doctor, pharmacist, and (most concerned) other person can have an effect on this relationship. This possibility is discussed more under implications for future study.

The most critical findings seem to suggest that the model needs refinement to reflect dimensions to perceived medication stress and medication adherence. Furthermore, medication specific social support items will need to be formulated to reflect an impact on the specific relationships between kinds of perceived medication stress and kinds of medication adherence.

Implications for Pharmacy Practice

It has been suggested from previous studies (Coyne and Delongis, 1986) that therapeutic and preventative efforts will be most successful when they proceed from a specific understanding of the target population, environmental setting, target behavior, and the nature of the optimal congruence between them. Presently, the social support literature is limited in what it can offer to the pharmacist. An important property of the study was that it makes the social support literature relevant to the practice of pharmacy.

Perceived medication stress is thought to have both a main (direct) effect, and a mediating (indirect) effect on the relationship between medication-related stressors and medication adherence. When perceived medication stress exhibits a main effect on the relationship between medication-related stressors and medication adherence, perceived medication stress will have a detrimental effect on medication adherence regardless of the level of medication-related stressors. When perceived medication stress exhibits a mediating effect on the relationship between medication-related stressors and medication adherence, a high level of experience with a certain type of medication-related stressor might generate evaluations of these experiences as stressful by various transformations processes internal to the person and that cause him to not perform medication adherence behaviors. This partial mediating process seems to be true for each type of medication-related stressor.

Medication-specific social support acts on two other relationships. In the first relationship, medication-specific social support acts upon the association between medication-related stressors and perceived medication stress. In the second relationship, medication-specific social support acts upon the association between perceived medication stress and medication adherence. Medication-specific social support has either a main (or direct) effect, or a moderating (or buffering) effect on these relationships. All the (most concerned) other person types of medication-specific social support seem to exhibit main effects, while in contrast the consultation type of medication-specific social support from the doctor and pharmacist exhibits a moderating effect.

When medication-specific social support exhibits a main effect on the relationship between medication-related stressors and perceived medication stress, a threshold level of effort will have a certain beneficial effect regardless of the patient's level of medication-related stressors. For example, if a diabetic man knows that his (most concerned) other person will pickup his insulin whenever he needs it, his perceived medication stress will be lower than if he didn't have his family to count on to do this for him.

When social support exhibits a moderating effect on the relationship between medication-related stressors and perceived medication stress, the medication-specific social support will have a beneficial effect only if the medication-specific social support offered to the individual is high enough to help that person deal with the medication-related stressor he or she is experiencing. In this situation, medication-specific social support will require a higher level of effort to have a beneficial effect. For example, the same man's doctor or pharmacist may need to advise this diabetic man on the use of a new electronic blood glucose monitor. It may take more than one counseling session with the doctor or pharmacist to bring the man's perceived medication stress level down. By offering more medication-specific social support to the patient to help him deal with this medication-related stressor he is experiencing often, the extra time spent is not only prudent but necessary.

As with most practical applications, the understandable push for implementation often predates an adequate knowledge base. The findings of this study are only a beginning and its use in the specification of veterans administration policy may be premature.

The most critical findings seem to suggest that the model needs refinement to reflect dimensions to perceived medication stress and medication adherence. Furthermore, medication specific social support items will need to be formulated to reflect an impact on the specific relationships between kinds of perceived medication stress and kinds of medication adherence. If future studies reveal this to be true, new skills may have to be developed to help the subject deal with advising, isolating, reminding, and obtaining kinds of perceived medication stress. Hopefully, these kinds of perceived medication stress support will have a moderating effect on the relationships between the specific kinds of perceived medication stress and specific kinds of medication adherence.

Implications for Future Research

There are a number of implications for future research suggested by this study. Each of these will be discussed in turn.

In this study, the subjects were responding to questionnaires mailed to them from the same place they were mailed their medications. It is therefore likely, that in this sample frame, the subjects did not perceive themselves to be getting much support from the pharmacist who mailed them their medications. Future studies should focus on elderly populations who receive more support from their pharmacist. For example, the same methodology should be applied to elderly patients that see pharmacists on a monthly basis, for example, in an anticoagulation clinic run by a pharmacist.

Perceived medication stress is probably a more complex phenomenon than what has been demonstrated here. In this study, only four items served as a measure for perceived medication stress and were adapted from a scale developed to measure psychosocial adjustment specific to diabetes (Polonsky et al., 1995). The "gold standard" in the field of perceived stress is the 14-item Perceived Stress Scale developed by Cohen, Karmack, and Mermelstein (1983). In a follow up study conducted by Hewitt et al. (1992), it was found that the Cohen, Karmack, and Mermelstein (1983) scale had two factors reflecting the following: 1.) adaptation, and 2.) coping ability. Since many items in the "gold standard" could be adapted for medication taking, it might also be reasonable to suggest that a larger perceived medication stress scale (larger than the four items used in this study) may have two or more factors.

It has also been suggested that medication adherence is multidimensional in nature (Lee et al., 1991). Medication adherence may have intentional and nonintentional components.

If stressors, perceived stress, and medication adherence are all multidimensional concepts, the chance for the elucidation of stronger mediating and moderating effects than the ones found in this study are possible. It could be for example, that the relationship between advising stressors and advising medication adherence are mediated by an advising perceived medication stress. It could also be for example, that the relationship between advising perceived medication stress and advising medication adherence is moderated by an advising perceived medication stress type of support.

The stress-amplifying effects of medication-specific social support were not addressed in this study. Okun, Melichar, and Hill (1980) examined whether positive and negative social ties moderate the effects of stressors on perceived stress. In accord with the stress-buffering hypothesis, the effect of stressors on perceived stress significantly decreases as positive social ties increased. This was a particularly solid foundation for this more specific study. However, Okun, Melichar, and Hill (1980) also found that, contrary to the stress-amplifying hypothesis, negative social ties did not interact with stressors to influence perceived stress, but, instead, had a significant additive effect on it. This latter relationship should be addressed in a future study.

The conditioning variables that were examined in this study may only represent the "the tip of the (conditioning variable) iceberg." For example, the Multidimensional Health Locus of Control (Wallston, Wallston, and DeVillis, 1978) might be significant in predicting adherence when used analytically with or without social support (Lewis, Morisky, and Flynn, 1986). Previous research has had disappointments using this variable (see e.g., Gravely and Oseasohn, 1991). However, examining it in conjunction with medication-specific social support may shed "light" on why it had no significant effect on medication adherence. Mental status may also be another important conditioning variable (Pfeiffer, 1975), especially with elderly outpatients when examined with or without social support.

Several variables suggested by the Stress Model of Medication Adherence were not developed in this study. One of the most important variables not addressed in this study was coping which has been suggested in previous research (Kruse and Brandenburg, 1994). Lazarus (1977) has proposed that the particular kinds of coping behaviors which people use are determined by both the subject's personal characteristics and those of their social environment, and, most importantly, by the nature of the stress with which they are contending. Coping questionnaires have already been developed for particular illnesses (e.g., for depression, Kleinke, 1988) and it would seem prudent to develop a coping questionnaire for elderly outpatients coping with medication-taking. When responses from this coping scale are inserted into a multiple regression equation with responses from the other stress model scales, the explained variance may increase.

The measurement of medication adherence would be greatly enhanced with the use of a better (more objective) measure of adherence. The newer Medication Event Monitoring System (MEMS-3) should be considered for a more comprehensive longitudinal study.

Enduring health outcomes are not part of this study. There are a number of stable and responsive health-related quality of life (HRQOL) scales which could be utilized. However, this should not mean that other even more sensitive scales might not be developed. For example, among elderly outpatients, Avlund et al. (1993), have developed a new measure of instrumental activities of daily living (IADLs) that subdivides IADLs into "tiredness" and "speed." This new measure, for example, may be particularly useful in assessing medication-related stressors, medication-specific social support, perceived medication stress, and medication adherence among more vulnerable elderly outpatients taking medications to improve their mobility.

Variables from other models of medication adherence could be brought to bear in a follow-up study to improve the prediction of medication adherence. These factors include the subject's personal history, experiences with the relief of complaints or symptoms, familial and cultural influences, and other predisposing and enabling characteristics (Kohn and White, 1975).

In a future study, it may be prudent to investigate how different classes of drugs invoke different medication-related stressors. It might be the drugs with narrow therapeutic indexes, may not only invoke more types of stressors, but stressor experiences with more intensity among the elderly.

Finally, experimental and longitudinal features will have to be incorporated in the future studies to fully explicate the entire theoretical stress model of medication adherence. Furthermore, the results should be analyzed using a structural equation with latent variables approach.

Conclusions

There is actually no literature to support the notion that medication nonadherence is greater in the elderly, but because of the potential harmful effects of under- and over-dosing combined with aging, nonadherence is more hazardous for this population segment (Cargill, 1992). This was one of the major reasons for this study.

The research reported here had two aims. The first aim was to explore and describe medication-related stressors, perceived medication stress and medication-specific social support. The second aim was to test for mediating effects of perceived stress to test for the moderating effects of medication-specific social support.

The results of this exploratory study seem to suggest that for this sample of elderly outpatients there may be as many as four types of medication-related stressors: 1.) advising, 2.) reminding, 3.) obtaining, and 4.) isolating. The results also suggest that perceived medication stress partially mediates the relationships between type of stressors and medication adherence.

Three types of medication-specific social support (i.e., consultation, actuation, and acquisition support) from the doctor did seem to moderate some of the relationship between certain kinds of medication-related stressors (i.e., advising, reminding, and obtaining stressors, respectively) and perceived medication stress. And, as hypothesized, one type of medication-specific social support (i.e., consultation support) from the pharmacist did seem to moderate some of the relationship between one kind of medication-related stressors (i.e., advising stressors) and perceived medication stress. This suggests that the doctor and pharmacist seem to make an assessment of each elderly patient's perceived medication stress level, and then attempts to match their level of a certain kind of support to help that elderly patient deal effectively with that certain type of stressor.

Some kinds of medication-specific social support offered from particular individuals did not seem to moderate the relationship between kinds of medication-related stressors and perceived medication stress. Affirmation support from the doctor, pharmacist, and (most concerned) other person did not seem to moderate the relationship between isolating stressors and perceived stress. Also, affirmation support from the doctor, pharmacist, and other person did not seem to moderate the relationship between perceived stress and medication adherence. In addition, neither actuation and acquisition support from either the pharmacist or other person seemed to moderate the relationship between reminding and obtaining stressors, respectively, and perceived medication stress. Finally, consultation support from the other person did not seem to moderate the relationship between advising stressors and perceived medication stress. This suggests that for these situations the helping individual does not need to make an assessment of the elderly patient's perceived medication stress level, and then attempt to match their level of a kind of support to help the elderly patient deal effectively with a certain type of stressor. Instead, it seems to suggest that the helping individual need only offer a threshold level of a kind support to help the patient deal with a type of stressor. To offer the elderly patient a higher level of a certain kind of support would not help bring the elderly patient's level of perceived stress down any. These unexpected results might be explained in three ways: 1.) the helping individual's kind of support really has no moderating effect on the hypothesized relationship for this sample, or 2.) there is a psychometric problem with the item for the helping individual's support, or 3.) a combination of the first two reasons.

The results of this study seem to be theoretically consistent with the proposed model, in that the associations between stressors and perceived stress, and the associations between perceived stress and adherence are fairly strong. However, the weakness of the associations between support and perceived stress and between support and adherence seem to suggest that the model needs refinement to reflect the impact of specific types of support by incorporating specific types of perceived stress and adherence behaviors. It may be that advising, reminding, obtaining, and isolating perceived stress, all need to be considered for inclusion into the model. And, it may be that an adherence scale will need to be considered with different dimensions to reflect advising adherence behavior, reminding adherence behavior, obtaining adherence behavior, and isolating adherence behavior. Finally, more specific support items will need to be formulated for the doctor, pharmacist, and other person to reflect each "persons" specific impact on the specific relationships between stressors and types of perceived medication stress and between types of perceived medication stress and types of adherence.

This has implications for practice, in that the doctor, pharmacist, and (most concerned) other person may need to learn a new set of skills to help the patient deal not only with the specific relationships between specific stressors and different types of perceived medication stress, but specific relationships between different types of perceived medication stress and different types of medication adherence behaviors.

Although the hypotheses were not all supported, this study does make two important additions to the literature on medication adherence among elderly outpatients: 1.) the study describes the mediating effects of perceived medication stress on the relationship between stressors and medication adherence by specifying a causal model, 2.) the study provides an incremental contribution to the explanation of the moderating effects of different types of support.

The development of theory depends upon the continued confirmation of hypotheses, rather than on the results of a single study (Dubin, 1978). The large sample size in this study, allowed very low correlations to be statistically significant. Furthermore, it has been suggested that more and better medication-specific social support items will need to be generated in future studies to tease out the clinical versus statistical significance distinction concerning medication-specific social support from the doctor, pharmacist, and most concerned other person. Research concerning medication adherence in the context of elderly outpatients dealing with stressors is in the initial stage of theory development and will require further replication before implementation of any programs.

INITIAL OUTPATIENT QUESTIONNAIRE

Veterans Administration

Our pharmacy is working with the University of Florida to improve the quality of health care we offer to patients who take medications. We are asking many patients, including yourself, for help in this effort.

How can you help? You can help by participating in a survey about dealing with medication problems. Please fill out this written questionnaire. After you fill out the questionnaire, please return it in the preaddressed, postage paid envelope provided.

The questionnaire should take about twenty minutes to complete. You may have someone help you complete the questionnaire. Your responses to the questionnaire will be kept confidential. Only the researchers at the University of Florida will have access to them.

If you can help, you may be making a valuable contribution to the improvement of our service to you and your fellow veterans. You have no obligation to participate in the survey and this will not affect your medical care from the VA.

Cordially,

Max Dame, M.S., R.Ph.
Chief, Pharmacy Service

PATIENT ID NO. (   )

PART A. Problems with your medications

Sometimes people have problems taking their medications that can range from minor annoyances to fairly major pressures, problems, or difficulties with the medications they take.

Listed on the following pages are a number of reasons that a person might feel stressed because of the medications they take. Read each statement and tell us if you have felt this way in the past year. ***Check the box on the right that best describes how often you felt that way*** **IN THE PAST YEAR.**

In the past year, how often have you:

	Never	Once in a while	Fairly often	Very often
1. Not known what to do if a side effect of your medication occurs	☐	☐	☐	☐
2. Needed something to remind you to take your medications on time	☐	☐	☐	☐
3. Had difficulty opening a medication container	☐	☐	☐	☐
4. Not known how to take your medication correctly	☐	☐	☐	☐
5. Had difficulty getting transportation to a doctor's office or pharmacy.	☐	☐	☐	☐
6. Had trouble choosing the right NONprescription medication	☐	☐	☐	☐
7. Felt that no one listened to you about your medication problems	☐	☐	☐	☐

	Never	Once in a while	Fairly often	Very often
8. Had trouble keeping track of how well your medication is working	☐	☐	☐	☐
9. Needed an up-to-date list of your medications to show to all your doctors	☐	☐	☐	☐
10. Believed that your medication does not help you feel better	☐	☐	☐	☐
11. Not known what to do if you missed a dose of medication	☐	☐	☐	☐
12. Wondered whether a medication given to you by one doctor should be taken with a medication given to you by a different doctor	☐	☐	☐	☐
13. Needed something to remind you to have your medications refilled on time	☐	☐	☐	☐
14. Wondered if you should drink alcohol and/or smoke while taking your medication	☐	☐	☐	☐
15. Felt you were treated differently because of the medication you take	☐	☐	☐	☐
16. Felt that no one seemed really interested in your health	☐	☐	☐	☐
17. Felt embarassed about taking your medications	☐	☐	☐	☐
18. Been afraid to ask someone to better explain something about your medication	☐	☐	☐	☐
19. Wondered if something that happened to you was a side effect of your medication	☐	☐	☐	☐
20. Had a side effect of your medication that has upset you	☐	☐	☐	☐

	Never	Once in a while	Fairly often	Very often
21. Needed easy to read information about the medication you take	☐	☐	☐	☐
22. Thought of changing the dose of your medication because you did not feel right	☐	☐	☐	☐
23. Been afraid that no one could help you deal with your health problems	☐	☐	☐	☐
24. Not felt confident about taking your medications as directed	☐	☐	☐	☐
25. Had problems paying for your medication ..	☐	☐	☐	☐
26. Had difficulty swallowing your medication ..	☐	☐	☐	☐
27. Felt that you did not need to take your medication	☐	☐	☐	☐

PART B. Help that others give you

Patients have many different experiences when they visit their doctor. Sometimes these experiences are good. Sometimes there is room for improvement.

During your most recent visit to a doctor at the clinic, how much of the following was done by the doctor? *Check one box for each item.*

The doctor:

	None or very little	A little	Some	A lot	A great deal
1. Made me feel confident I can take my medicines and can do what else was asked. .	☐	☐	☐	☐	☐
2. Helped me work through any worries or concerns related to my condition.	☐	☐	☐	☐	☐
3. Acted in a warm and friendly manner . . .	☐	☐	☐	☐	☐
4. Helped me fully understand when and how to follow my treatment.	☐	☐	☐	☐	☐
5. Overall, how much help and real concern about you and your health has been shown by your physician?	☐	☐	☐	☐	☐

Patients have many different experiences when they visit their pharmacist. Sometimes these experiences are good. Sometimes there is room for improvement.

During your most recent visit to a pharmacist, how much of the following was done by the pharmacist? *Check one box for each item.*

The pharmacist:

	None or very little	A little	Some	A lot	A great deal
1. Made me feel confident I can take my medicines and can do what else was asked. .	☐	☐	☐	☐	☐
2. Helped me work through any worries or concerns related to my condition.	☐	☐	☐	☐	☐

	None or very little	A little	Some	A lot	A great deal
3. Acted in a warm and friendly manner . . .	☐	☐	☐	☐	☐
4. Helped me fully understand when and how to follow my treatment.	☐	☐	☐	☐	☐
5. Overall, how much help and real concern about you and your health has been shown by your pharmacist?	☐	☐	☐	☐	☐

You probably have someone you consider the person most concerned about you and your health. This person may be a spouse or a good friend. How much of the following does this most concerned person do? ***Check one box for each item.***

This most concerned person:

	None or very little	A little	Some	A lot	A great deal
1. Makes me feel worthwhile and good about myself.	☐	☐	☐	☐	☐
2. Offers help and shows real concern about my health	☐	☐	☐	☐	☐
3. Helps me remember things such as taking my medicine, refilling prescriptions, and keeping doctor's appointments	☐	☐	☐	☐	☐
4. Helps me get to the doctor and the pharmacy	☐	☐	☐	☐	☐
5. Overall, how much help and real concern about you and your health has been shown by this most concerned person?	☐	☐	☐	☐	☐

PART C. Feelings about your health and medications

In this section, we would like you to tell us about your feelings and thoughts about your health and medications during the last month. ***For each statement, circle a number underneath the statement that reflects how much of a problem you have considered that feeling to have been.***

1. Feeling depressed when you think about having/living with your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

2. Not "accepting" your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

3. Feeling unsatisfied with your physician

No Problem 0 1 2 3 4 5 6 Serious Problem

4. Worrying about the future and the possibility of serious health problems

No Problem 0 1 2 3 4 5 6 Serious Problem

5. Feeling limited in what you can do physically because of your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

6. Feeling guilty or anxious when you get off track with your medication taking

No Problem 0 1 2 3 4 5 6 Serious Problem

7. Feeling that your illness is taking up too much mental and physical energy

No Problem 0 1 2 3 4 5 6 Serious Problem

8. Uncomfortable interactions with family/friends because of your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

9. Feeling that friends/family are not supportive of your efforts to manage your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

10. Feeling alone with your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

11. Feeling frustrated about things you would like to do but can't because of your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

12. Feeling "burned out" by the constant effort to manage your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

13. Not having clear and concrete goals for your health care.

No Problem 0 1 2 3 4 5 6 Serious Problem

14. Feeling scared when you think about having/living with an illness

No Problem 0 1 2 3 4 5 6 Serious Problem

15. Not knowing if the mood or feelings you are experiencing are related to your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

16. Feeling angry when you think about having/living with your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

17. Coping with your illness

No Problem 0 1 2 3 4 5 6 Serious Problem

18. Worrying about reactions (between two or more medications)

No Problem 0 1 2 3 4 5 6 Serious Problem

19. Feeling discouraged with your medication regimen

No Problem 0 1 2 3 4 5 6 Serious Problem

20. Feeling overwhelmed by your medication regimen

No Problem 0 1 2 3 4 5 6 Serious Problem

Part D. Medication Taking

The questions in this next section ask you about whether you sometimes forget to take the medication you have been prescribed by your doctor. ***Please answer by checking either the YES or NO box.***

	Yes	No
1. Do you forget to take your medicine?	☐	☐
2. Are you careless at times about taking your medicine?	☐	☐
3. When you feel better do you sometimes stop taking your medicine?	☐	☐
4. Sometimes if you feel worse when you take the medicine, do you stop taking it?	☐	☐
5. In the last 24 hours, have you missed a dose of medication?	☐	☐

People sometimes find it hard to follow the doctor's instructions for a variety of reasons. We are going to ask three questions about those medications your doctor prescribed that you are supposed to take every day or every other day. In other words, this is only about those medicines your doctor told you to take regularly. Thinking just about the past week, about how many times did you:

a. Forget to take a pill?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 OR MORE

b. Add an extra pill?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 OR MORE

c. Not take a pill on purpose?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 OR MORE

Part D. QUESTIONS ABOUT YOU

The following questions are questions about you. ***Please check ONE box underneath each item which corresponds most closely to you.***

1. What is your ethnic origin?

- ☐ **White (not of Hispanic origin)**
- ☐ **Black (not of Hispanic origin)**
- ☐ **Hispanic**
- ☐ **Asian or Pacific Islander**
- ☐ **American Indian or Native Alaskan**

2. What is your approximate gross annual income in dollars?

- ☐ **less than $5,000**
- ☐ **$5,000 to $9,000**
- ☐ **$10,000 to $14,000**
- ☐ **$15,000 to $19,000**
- ☐ **$20,000 to $24,000**
- ☐ **$25,000 to $29,000**
- ☐ **$30,000 to $34,000**
- ☐ **$35,000 to $39,000**
- ☐ **Greater than $40,000**

3. In general, would you say your health is?

☐ **Excellent** ☐ **Very Good** ☐ **Good** ☐ **Fair** ☐ **Poor**

THANK YOU for your time in answering these questions and mailing this questionnaire back to us at your earliest convenience!

REVISED OUTPATIENT QUESTIONNAIRE

A SURVEY OF NORTH-CENTRAL FLORIDA AND SOUTHERN GEORGIA VETERANS ABOUT MEDICATION-RELATED PROBLEMS

Medications are the most important way of treating many of the chronic medical conditions that veterans have. Some veterans find it easy to take their medications. Some veterans do not find it so easy for many reasons. The University of Florida College of Pharmacy and the Gainesville VAMC are working together so that we can find out those reasons. This will help us to better meet the needs of North-Central Florida and Southern Georgia veterans who need to take medications for their health. You have been selected to represent the veterans at the Gainesville VAMC who take medications. Since you take medications from the Gainesville VAMC, your opinions are very important to us because they represent the opinions of all the other veterans who are not contacted or are not able to answer our questions. We would like to know the needs of our veterans so that we can improve our services for you. To meet those needs, we need to ask you some questions. We need to know how many veterans have problems with taking their medications and what kinds of problems that they have. Even if you are taking very few medications and do not have any problems with them right now, your answers to these questions are still very important to us. If you are taking many medications for your health, your answers are very important to us too.

Please answer all the questions as best as you can. It should take you about 20 minutes to answer all of the questions. If you wish to comment on any question or qualify your answers, please feel free to use the space in the margins. Your comments will be read and taken into account. If you are unable to answer the questionnaire because you cannot read it because the print is too small or for some other reason, please contact David Gettman at (352) 392-9035. If he is not there at that moment, he will call you back and ask you the questions over the telephone. While your answers are very important to us, if you choose not to answer the questions, it will not affect your health benefits.

Return this questionnaire to:

UNIVERSITY OF
FLORIDA

College of Pharmacy
Pharmacy Health Care
PO Box 100496
Gainesville FL 32610-0496

PATIENT ID NO. (   )

Policymakers concerned with designing programs need to better understand how people help our veterans to take their medications. Therefore, we would like to ask you to describe your feelings about the medications that you take and the help that you get from others in taking them. In this first section, we will first ask you about your doctor. Next, we will ask you similar questions about your pharmacist. Finally, we will ask you some questions about someone else in your life who helps you take your medications.

Veterans have different experiences when they visit their doctor. Sometimes these experiences are good. Sometimes there is room for improvement. We would like to ask you about the last time you visited the doctor. FOR EXAMPLE: If during your last visit your doctor acted in a warm and friendly manner "some" during your last visit, you might circle "3."

1 NONE OR VERY LITTLE
2 A LITTLE
[✓ 3] SOME
4 A LOT
5 A GREAT DEAL

During your most recent visit to a doctor at the clinic, how much of the time did the doctor do the following things for you? ***Circle one number for each question.***

Q-1 The doctor helped me fully understand when and how to follow my medication treatment. (Circle number)
1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-2 The doctor helped me become aware of things I didn't know about my medications. (Circle number)
1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-3 The doctor helped me feel confident I can take my medicines. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-4 The doctor helped me work through any worries or concerns related to my medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-5 The doctor helped me get the right medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-6 The doctor helped me get the things I needed to take my medications the right way. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Next, we would like to find out about your experiences with the pharmacist. Veterans also have different experiences when they visit their pharmacist. Sometimes these experiences are good, but there may sometimes be room for improvement.

During your most recent visit to a pharmacy, how much of the time did the pharmacist do the following things for you? *Circle one number for each question.*

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Q-7 The pharmacist helped me fully understand when and how to follow my medication treatment. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-8 The pharmacist helped me become aware of things I didn't know about my medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-9 The pharmacist helped me feel confident I can take my medicines. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-10 The pharmacist helped me work through any worries or concerns related to my medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-11 The pharmacist helped me get the right medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-12 The pharmacist helped me get the things needed to take my medications the right way. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Veterans have very different experiences with people other than health professionals regarding their medication taking. You may know someone that shows concern about you and your medication taking. This person may be a spouse, a good friend or another person. How much of the time has this "most concerned other person" done the following for you in the last month? ***Circle one number for each question.***

Q-13 This person helped me fully understand when and how to follow my medication treatment. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-14 This person helped me become aware of things I didn't know about my medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-15 This person helped me feel confident I can take my medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

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Q-16 This person helped me work through any worries or concerns related to my medications. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-17 This person helped me remember things such as taking my medicine and refilling my prescriptions. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

Q-18 This person helped me get to the pharmacy. (Circle number)

1 NONE OR VERY LITTLE
2 A LITTLE
3 SOME
4 A LOT
5 A GREAT DEAL

An important part of understanding the problems veterans face taking their medications has to do with understanding the feelings they have if they have experienced one or more problems with their medications. Some veterans might say that these feelings are no problem for them. Other veterans may say that these feelings are a serious problem. Still others might say there is a problem, but the seriousness of the problem lies somewhere "in-between" no problem and a serious problem. FOR EXAMPLE: If this past year the feeling of being "burned out" by the constant effort to manage your medications has been a pretty serious problem, you might circle "4."

NO PROBLEM 0 1 2 3 [✓ 4] 5 6 SERIOUS PROBLEM

If it is only a little problem, you might circle "2."

NO PROBLEM 0 1 [✓ 2] 3 4 5 6 SERIOUS PROBLEM

For each statement in this section, circle a number underneath the statement that reflects how serious a problem you have considered that feeling or thought to have been this past year on a scale of increasing seriousness from 0 (no problem) to 6 (serious problem).

Q-19 This past year how serious have been your feelings of guilt or anxiety when you got off track with your medication taking. (Circle number)

NO PROBLEM 0 1 2 3 4 5 6 SERIOUS PROBLEM

Q-20 This past year how serious have been your worries or concerns about reactions between two or more medications. (Circle number)

NO PROBLEM 0 1 2 3 4 5 6 SERIOUS PROBLEM

Q-21 This past year how serious have been your feelings of discouragement with your medication regimen. (Circle number)

NO PROBLEM 0 1 2 3 4 5 6 SERIOUS PROBLEM

Q-22 This past year how serious have been your feelings of being overwhelmed by your medication regimen. (Circle number)

NO PROBLEM 0 1 2 3 4 5 6 SERIOUS PROBLEM

Medications are the most important way of treating many diseases or medical conditions. Some veterans find it very easy to take their medications as directed. It is more difficult for other veterans. We would like to ask you about your experiences with taking medications that have been prescribed to you by your doctor. ***Circle one number for each question.***

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Q-23 Do you forget to take your medicine? (Circle number)

1 NO
2 YES

Q-24 Are you careless at times about taking your medicine? (Circle number)

1 NO
2 YES

Q-25 When you feel better do you sometimes stop taking your medicine? (Circle number)

1 NO
2 YES

Q-26 In the last 24 hours, have you missed a dose of medication? (Circle number)

1 NO
2 YES

Another important way that can help us to help you better is to learn more about the problems veterans face when taking their medications. Sometimes veterans never experience any of these problems. And, sometimes veterans may experience a problem very often. Listed on the next few pages are problems a veteran might hav felt in the last year. Read each statement and tell us how often you may have experienced this problem in the past year.

FOR EXAMPLE: If you think that in the past year, you have never had a problem paying for your medications, you might circle "1."

[✓ 1 NEVER]
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Circle the number that best describes how often you experienced each problem in the past year.

Q-27 In the past year, how often have you felt that you were taking too many medications? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-28 In the past year, how often have you needed something to remind you to take your medications on time? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-29 In the past year, how often have you had difficulty opening a medication container? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-30 In the past year, how often have you felt that taking your medications as directed by your doctor was easy? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-31 In the past year, how often have you had difficulty getting transportation to a pharmacy? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-32 In the past year, how often have you felt uncomfortable interrupting the pharmacist to ask a question? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

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Q-33 In the past year, how often have you felt that if you had a medication problem you could deal with it the right way? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-34 In the past year, how often have you had trouble keeping track of how well your medication is working? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-35 In the past year, how often have you needed an *up-to-date* list of your medications? (Circle number) 1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-36 In the past year, how often have you believed that your medication does not help you feel better? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-37 In the past year, how often have you not known what to do if you missed a dose of medication? (Circle number)1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-38 In the past year, how often have you wondered whether a medication given to you by one doctor should be taken with a medication given to you by a different doctor? (Circle number) 1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-39 In the past year, how often have you needed something to remind you to have your medications refilled on time? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-40 In the past year, how often have you wondered if you should drink alcohol and/or smoke while taking your medication? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-41 In the past year, how often have you felt like you had a problem with your medication? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-42 In the past year, how often have you felt that no one listened to you about your medication problems? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-43 In the past year, how often have you felt that no one seemed really interested in your medication taking? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

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Q-44 In the past year, how often have you been afraid to ask someone to better explain something to you about your medication? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-45 In the past year, how often have you wondered if something that happened to you was a side effect of your medication? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-46 In the past year, how often have you had a side effect of your medication that has upset you? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-47 In the past year, how often have you needed easy to read information about the medications you take? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-48 In the past year, how often have you thought of changing the dose of your medication because you did not feel right? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-49 In the past year, how often have you felt that no one could help you deal with your health problems? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-50 In the past year, how often have you NOT felt confident about taking your medications as directed? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-51 In the past year, how often have you had difficulty swallowing your medication? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-52 In the past year, how often have you felt that no one could help you deal with your medication problems? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-53 In the past year, how often have you wondered how long you will have to take your medication? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

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Q-54 In the past year, how often have you wondered why your medication was prescribed? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Q-55 In the past year, how often have you felt that no one seemed really interested in your health? (Circle number)

1 NEVER
2 ONCE IN A WHILE
3 FAIRLY OFTEN
4 VERY OFTEN

Finally, we would like to ask a few questions about yourself for statistical purposes. ***Please circle one number underneath each question.***

Q-56 What is your ethnic origin? (Circle number)

1 Black (not of Hispanic origin)
2 White (not of Hispanic origin)
3 Hispanic
4 Asian or Pacific Islander
5 American Indian or Native Alaskan

Q-57 What was your approximate net family income from all sources, before taxes, in 1996? (Circle number)

1 LESS THAN $5,000
2 $5,000 to $9,999
3 $10,000 to $14,999
4 $15,000 to $19,999
5 $20,000 to $24,999
6 $25,000 to $29,999
7 $30,000 to $34,999
8 $35,000 to $39,999
9 GREATER THAN $40,000

Q-58 In general, would you say your health is? (Circle number)

1 Poor
2 Fair
3 Good
4 Very Good
5 Excellent

Is there anything else you would like to tell us about the kinds of problems you experience taking your medications? If so, please use this space for that purpose.

Also, any comments you wish to make that you think may help in future efforts to understand what medication-related problems veterans must deal with will be appreciated, either here or in a separate letter.

Your contribution to this effort is very greatly appreciated. If you would like a summary of results, please print your name and address on the back of the return envelope (NOT on this questionnaire). We will see that you get it.

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BIOGRAPHICAL SKETCH

As an air force brat, David Allen Gettman traveled extensively through the United States and western Europe with his parents and seven brothers and sisters. After graduation from high school he enlisted in the Navy as a hospital corpsman during the Vietnam War. Following an assignment with the marine corps, and an honorable discharge, he moved to Montana to become a pharmacist.

After graduation from the University of Montana, he moved to the mid-Atlantic seaboard and enjoyed working as a pharmacist at various medical centers and community pharmacies. Soon after his graduation from the College of William and Mary with a Masters in Business Administration, he was assigned as a reserve air force officer at Homestead Air Force Base during Desert Shield/Storm.

Following his doctoral work at the University of Florida, he plans to move to the Sandia Mountains east of Albuquerque with his wife Mary Ann Harhi-Gettman and their son Paul James Gettman. They both plan to work at the University of New Mexico: he plans to be a faculty member of the Department of Pharmacy Practice while she plans to work as a registered nurse in the Pediatric Intensive Care Unit of the Children's Hospital.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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